PPRP-R-20

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ENVIRONMENTAL RADIONUCLIDE CONCENTRATIONS IN THE VICINITY OF THE CALVERT CLIFFS NUCLEAR POWER PLANT: 1991-1994

FEBRUARY 1997

MARYLAND POWER PLANT RESEARCH PROGRAM

STATE OF MARYLAND
DEPARTMENT OF NATURAL RESOURCES

The Maryland Department of Natural Resources (DNR) seeks to preserve, protect and enhance the living resources of the State. Working in partnership with the citizens of Maryland, this worthwhile goal will become a reality. This publication provides information that will increase your understanding of how DNR strives to reach that goal through its many diverse programs.

John R. Griffin
Secretary
Maryland Department of Natural Resources

PPRP-R-20

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February 1997

FOREWORD

This report, *Environmental Radionuclide Concentrations in the Vicinity of the Calvert Cliffs Nuclear Power Plant: 1991-1994*, contains the results of monitoring and research programs conducted by the Maryland Department of Natural Resources, Power Plant Research Program, to evaluate the fate and effects of radionuclides released from the Calvert Cliffs Nuclear Power Plant from 1991 through 1994. This is the sixth in a series of radiological assessment reports detailing monitoring efforts in the vicinity of the Calvert Cliffs Nuclear Power Plant since 1975. This report was prepared under Contract Nos. PR91-047-001 and PR96-055-001 with the Maryland Department of Natural Resources, Power Plant Research Program to Versar, Inc.

The preferred citation for this report is

Stanek, M.A., T.S. Jones, J.B. Frithsen, and R.I. McLean. 1997. Environmental radionuclide concentrations in the vicinity of the Calvert Cliffs Nuclear Power Plant: 1991-1994. PPRP-R-20. February 1997. Maryland Department of Natural Resources, Power Plant Research Program, Annapolis, MD.

ACKNOWLEDGMENTS

The authors thank Captain Rick Younger and the crew of the R.V. Discovery (Maryland Geological Survey) for assistance with the collection of sediments for radiological analysis. We thank Mr. George R. Abbe and staff (Academy of Natural Sciences, Benedict Estuarine Research Laboratory) for designing equipment and collecting oyster samples. We also thank Baltimore Gas and Electric Company for providing radionuclide-release data for CCNPP.

Anthony Maranto, Allison Brindley, Luz G. Huntington, and Colin Roby provided assistance with sediment and biological sample preparation, sediment particle size analysis, and coding of radiological data for incorporation into a computer data base. Janis Chaillou, Mike Gaughan, and Rose Newport provided assistance with managing the computer database.

ABSTRACT

The Maryland Power Plant Research Program monitors concentrations of natural, weapons, and power plant produced radionuclides in environmental samples collected from the Chesapeake Bay in the vicinity of the Calvert Cliffs Nuclear Power Plant (CCNPP). The purpose of this monitoring is to determine the fate, transport, and potential effects of power plant produced radionuclides. This report contains a description of monitoring activities and data collected during the period 1991 through 1994 and is the sixth in a series reporting monitoring results initiated at CCNPP in 1975.

All releases during the reporting period were as a result of normal plant operations and no releases exceeded limits set by the U.S. Nuclear Regulatory Commission (USNRC).

Radionuclide concentrations in shellfish and sediment were measured using high-resolution gamma spectrometry. Radionuclides in environmental samples originated from natural sources, atmospheric weapons testing, and normal operations of CCNPP. Naturally occurring ^{40}K and decay products of uranium and thorium were detected in most biota and all sediment samples collected during the monitoring period. Concentrations of naturally occurring radionuclides are typically almost an order of magnitude higher than plant-produced radionuclides. The single radionuclide related to fallout from weapons testing detected in environmental samples collected from 1991 to 1994 was ^{137}Cs.

Small concentrations of radionuclides originating from CCNPP were detected in sediments and biota collected in the vicinity of CCNPP. Common radionuclides detected included ^{58}Co, ^{60}Co, ^{110m}Ag, and ^{137}Cs. The principal CCNPP-related radionuclide found in sediments was ^{60}Co. CCNPP-related radionuclides represented a small fraction of the total concentration of radionuclides detected in the sediments and biota collected from Chesapeake Bay. Total concentrations of radionuclides detected in sediment and biota did not exceed any USNRC action levels.

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ACRONYMS, CHEMICAL ABBREVIATIONS, AND UNITS OF MEASUREMENT

ACRONYMS

BGE	-	Baltimore Gas and Electric Company
CCNPP	-	Calvert Cliffs Nuclear Power Plant
DNR	-	Maryland Department of Natural Resources
GPUN	-	General Public Utility Nuclear Corporation
LLD	-	Lower Limit of Detection
MDE	-	Maryland Department of the Environment
NCRPM	-	National Council on Radiation Protection and Measurements
PBAPS	-	Peach Bottom Atomic Power Station
PPRP	-	Power Plant Research Program
PWR	-	Pressurized Water Reactor
USAEC	-	United States Atomic Energy Commission
USNRC	-	United States Nuclear Regulatory Commission

CHEMICALS

Ag	silver
Ac	actinium
Ba	barium
Be	beryllium
Bi	bismuth
C	carbon
Ce	cerium
Co	cobalt
Cr	chromium
Cs	cesium
Ge	germanium
H	hydrogen
^{3}H	tritium
I	iodine
K	potassium
Li	lithium
Mn	manganese
Na	Sodium
Nb	niobium
Nd	neodymium
Pb	lead
Pu	plutonium
Ra	radium
Ru	ruthenium
Sb	antimony
Se	selenium
Sn	tin
Sr	strontium
Th	thorium
Tl	thallium
U	uranium
Xe	xenon
Zn	zinc
Zr	zirconium

UNITS OF MEASUREMENT

Ci	curies
cm	centimeters
dpm	disintegrations per minute
keV	thousand electron volts
kg	kilograms
km	kilometers
l	liters
m	meters
mi^2	square miles
min	minutes
mm	millimeters
mrem	millirem
MW	megawatts
pCi	picocuries
ppm	parts per million
ppt	parts per thousand
μm	micrometers
yr	year

RADIOLOGICAL DEFINITIONS

Activity. The quantification of the rate of radioactive decay of radioactive material.

Becquerel. A unit of radioactivity. One becquerel is defined as 1 disintegration per second.

Curie (Ci). A unit of radioactivity. One curie is defined as 3.7×10^{10} disintegrations per second.

Dose. The energy imparted to matter by ionizing radiation. The unit of absorbed dose is the rad, equal to 0.01 joules per kilogram for irradiated material in any medium.

Dose commitment. The dose that an organ or tissue would receive during a specified period of time (e.g., a 50-year period is used in dose calculations in this report) as a result of intake (as by ingestion or inhalation) of one or more radionuclides from one year's release.

Environmentally significant. As used in this report, refers to radionuclides that are known to be assimilated by biological organisms and are discharged in detectable amounts. Not included are aqueous release of noble gases, tritium, or very short-lived radionuclides.

Half-life. The time required for a radioactive substance to lose one-half of its activity by decay. Each radionuclide has a unique half-life.

Ionizing radiation. Any electromagnetic or particulate radiation capable of producing ions (electrically charged atoms or atomic particles), directly or indirectly, in its passage through matter.

Maximally exposed individual. A hypothetical individual who remains in an uncontrolled area and would, when all potential routes of exposure from a facility's operations are considered, receive the greatest possible dose.

Radioactive decay. The spontaneous transformation of one nuclide into a different radioactive or nonradioactive nuclide, or into a different energy state of the same nuclide.

Radionuclide. An unstable nuclide capable of spontaneous transformation into other nuclides by changing its nuclear configuration or energy level. This transformation is accompanied by the emission of photons or particles.

Rem. The effective dose equivalent (i.e., the absorbed dose multiplied by the quality factor associated with the type of radiation).

Stable. Not radioactive or not easily decomposed or otherwise modified chemically.

1.0 INTRODUCTION

The Calvert Cliffs Nuclear Power Plant (CCNPP) generates both gaseous and liquid radioactive wastes that are discharged to the atmosphere and Chesapeake Bay. Although atmospheric releases consist mainly of radioactive noble gases, which have little environmental significance, aqueous discharges to the Chesapeake Bay contain radionuclides that can be accumulated by biota and become associated with sediments. These radionuclides ultimately may contribute to a radiation dose to man by being transported through the food chain.

This report examines and summarizes the results of monitoring and research programs conducted in the vicinity of the CCNPP from 1991 through 1994 by the Maryland Power Plant Research Program (PPRP). The report includes

- quantities of environmentally significant radionuclides discharged to the Chesapeake Bay by CCNPP;
- descriptions of procedures for collecting, treating, and analyzing environmental samples;
- radionuclide concentrations measured in more than 500 samples of shellfish and sediment collected in the vicinity of CCNPP; and
- an assessment of the environmental and health-related effects of radioactive discharges from CCNPP detected in Chesapeake Bay.

1.1 MONITORING OBJECTIVES

The Power Plant Research Program (PPRP) of the Maryland Department of Natural Resources (DNR) has conducted research and monitoring programs since 1975 to assess the effects of radioactive material released from CCNPP on Maryland's ecological resources. These research and monitoring programs evaluate radiological effects within individual trophic levels of the Chesapeake Bay ecosystem and provide information concerning the behavior and fate of radionuclides released to Chesapeake Bay. These monitoring data are also used to estimate the radiological dose to human populations resulting from the discharge of radionuclides from power plants.

As part of these monitoring efforts, PPRP conducts or sponsors projects involving exposing shellfish to CCNPP discharges for a variety of predefined exposure periods to determine the mechanisms that regulate uptake and elimination of radionuclides in specific estuarine organisms. Oysters are important biological indicators of environmental radionuclide concentrations. Because they are sessile, oysters in the vicinity of CCNPP are more exposed to aqueous releases of radioactive material than mobile biota such as finfish and crabs. Oysters filter large amounts of particulate material and plankton that may have adsorbed

radionuclides and accumulate heavy metals and radionuclides (McLean et al. 1987). Documenting radionuclide concentrations in oysters is important because they are harvested commercially in Chesapeake Bay and represent a potential pathway for human exposure to plant discharged radionuclides.

Radionuclide monitoring conducted by PPRP primarily focuses on discharges to water and transfers within aqueous pathways; however, atmospheric releases of radioactive material are also assessed using data collected by BGE and Maryland Department of the Environment (MDE). The results of these assessments are published biannually (Maranto and McLean 1993, Stanek and McLean 1995 b).

1.2 DESCRIPTION OF PLANT AND STUDY SITE

The Baltimore Gas and Electric Company (BGE) owns and operates CCNPP. The plant is in Calvert County, Maryland, on the western shore of Chesapeake Bay (Figure 2-1). Each of CCNPP's two units is a pressurized water reactor (PWR) with an operating capacity of 860 megawatts, currently licensed to operate through 2014 and 2016 respectively. Controlled releases of radionuclides are permitted at levels defined in CCNPP's license (issued July 31, 1974 for Unit 1 and November 30, 1976 for Unit 2) from the United States Nuclear Regulatory Commission (USNRC 10 CFR Part 20, Appendix B, 1991).

The western shore of Chesapeake Bay is constantly scoured by tides, wind, and waves. The bay in this area is approximately 4.5 km wide and relatively shallow. From the shoreline, water depth gradually increases to 10 to 15 m about 0.8 km offshore. This depth extends approximately 3 km and increases to 20 m at midbay. The area is tidally influenced with a mean tidal range of 0.3 to 0.6 m. The current velocity in the vicinity ranges between 5 and 60 cm/sec (Lacy and Zeger 1979). Salinity varies seasonally and normally ranges from 7 to 17 ppt. Bottom sediments are characterized by medium coarse sands at depths ranging between 0 to 6 m, fine sands and clays at depths of 6 to 9 m, and clays and organic silt at depths greater than 10 m (Domotor and McLean 1988).

The Calvert Cliffs region of the Chesapeake Bay supports an abundant and diverse macrobenthic assemblage (Ranasinghe et al. 1996) and commercially important finfish and shellfish (Lippson and Lippson 1997). Oysters are present near CCNPP and are commercially harvested from the area. Blue crabs also are abundant throughout the site and are harvested commercially and recreationally. This area of the Chesapeake Bay also supports a diverse finfish community, including forage species (e.g., anchovies and silversides) and commercially important predatory species (e.g., weakfish, striped bass, and bluefish).

A detailed description of the Calvert Cliffs area can be found in the *Final Environmental Statement Related to the Operation of Calvert Cliffs Nuclear Power Plant, Units 1 and 2* (USAEC 1973). A revised environmental report is being prepared by BGE and is scheduled to be released during the summer of 1997 (BGE 1997).

1.3 RADIATION PROTECTION GOALS AND HEALTH PHYSICS

The ultimate goal of PPRP monitoring is to determine what effect, if any, the operation of the power plant, and its consequent effluent discharges, have on the environment. For the purpose of this report, the principal effect to be assessed is the increased radiological dose to ecological and human receptors resulting from power plant operation and the discharge of radionuclides. To assess relative importance, this increased dose needs to be compared to natural dose estimates; therefore, the following section will provide information on natural background radiation. This information is focused on human exposure because more information is available for human exposure compared to what is available for ecological exposure. Past tasks of the PPRP radionuclide monitoring program have included the examination of these pathways in order that all of the possible routes to man are taken into account.

1.3.1 Background Radiation

Radioactive isotopes occur naturally and exist everywhere in the environment (Table 1-1). The average radiation dose to man resulting from naturally occurring radionuclides is approximately 300 mrem/year or about 80% of the total dose man is likely to receive in a year. Principal sources of radiation to man include the following:

- Terrestrial sources of radiation come from naturally occurring primordial (i.e., present in the earth's crust since the time of the earth's creation) radionuclides such as ^{40}K and the Thorium and Uranium elements. These radionuclides typically have very-long half-lives, some exceeding several million years.

- Cosmic radiation includes cosmic rays, which originate outside of our galaxy, and the radiation resulting from the production of cosmogenic radionuclides in the upper atmosphere from cosmic ray interactions with atmospheric gases.

- Radionuclides in the body exist as a result of the ingestion of food and water which contain trace quantities of primordial radionuclides.

- Inhaled radionuclides are a result of inhalation of primordial radionuclides which have been transferred to the atmosphere. The primary target organ is the lungs.

- Consumer products include tobacco products, building materials, television sets, radioluminescent watches, airport inspection systems, smoke detectors, lantern mantels, etc.

Table 1-1. Sources of natural/background radiation (average for U.S. population). Source: NCRPM 1987, 1988.

	Average Annual Effective Dose Equivalent (mrem/yr)
Naturally Occurring	
External terrestrial	28
Cosmic	27
Radionuclides in the body (i.e., ^{40}K, ^{226}Ra)	40
Inhaled radionuclides (i.e. ^{222}Rn)	200
Medical	
Diagnostic X-rays	39
Therapeutic X-rays	< 1
Nuclear medicine	14
Consumer Products	6-12
Other	
Fallout	< 1
Nuclear Fuel Cycle	< 1
Occupational	< 1
Miscellaneous	< 1
Rounded Total:	360

1.3.2 Quantities and Units

The traditional and most common units of measure of radioactivity in the United States, and its effects are the curie and the rem (see glossary); however, these units have been replaced by the becquerel and the sievert, respectively, to conform to standard international unit convention.

The quantity of radioactive material which is decaying, or the rate of decay, is given in units of curies. Typically, environmental samples contain radioactive material at the picocurie level (10^{-9} curie). One picocurie of radioactive material is equivalent to a decay rate of 0.037 disintegrations of individual atoms per minute. Each disintegration (or transformation) produces one or more of several different types of radiation (alpha, beta, or gamma) of varying intensities.

Radiological dose units are typically expressed in units of **rem** (effective dose equivalent; Table 1-2). Adverse biological effects on man are more likely to occur at higher effective dose equivalents where non-stochastic effects (cell death) and stochastic effects (cancer) can occur.

Table 1-2. Determination of the effective dose equivalent.

The effective dose equivalent to man in mrem (for gamma rays) is given by:

$$H_E = \sum \frac{970\ w_T A \Gamma Q}{d_T^2}$$

where

w_T = weighting factor representing the proportion of the stochastic risk resulting from tissue T.
A = point source activity in becquerels.
Γ = specific gamma-ray constant for the source radionuclide.
d_T = distance from the source (assuming a point source) to the point at which the exposure rate is calculated (cm).
Q = quality factor based on the type of radiation (Q = 1 for gamma rays).

1.3.3 Protection Levels and Goals

The promulgated maximum annual effective dose equivalent to the general population as a result of licensee's activities involving the use of radioactive material is 100 mrem above background levels, exclusive of the dose contribution from the licensee's disposal of radioactive material (USNRC 1991). Dose limits for radioactive material in liquid effluents are more restrictive:

> "The dose or dose commitment to a member of the public from radioactive materials in liquid effluents released to unrestricted areas shall be limited: A) During the calendar quarter to less than or equal to 3.0 mrem to the total body and to less than or equal to 10 mrem to any organ, and B) During any calendar year to less than or equal to 6 mrem to the total body and to less than or equal to 20 mrem to any organ."

Therefore, this report will verify that the quantities of radionuclides found in sediment and biota do not pose a threat to human health as measured by their consequent effective dose equivalent as they migrate through trophic layers to man.

2.0 METHODS AND MATERIALS

2.1 SAMPLE COLLECTION

The scope of the PPRP radionuclide monitoring effort was scaled back during the 1991 to 1994 monitoring period. The program emphasis shifted from an examination of transfer between several trophic layers in a variety of biological samples to direct transfer between two trophic levels (oysters and humans). Direct measurement of radionuclides in finfish, blue crabs, grass shrimp, algae, and epifauna was discontinued when it was determined their monitoring was no longer needed to fulfill PPRP goals. Collection of shellfish, however, continued due to their tendency to accumulate and bioconcentrate radionuclides discharged from CCNPP and because shellfish represent a direct source to man of plant-produced radionuclides. Shellfish collected consisted almost exclusively of the tray oyster variety, since natural bar oyster populations have been depleted in recent years due to the diseases MSX and dermo. No natural bar oysters have been sampled since 1992.

Table 2-1 lists the environmental samples collected from the Chesapeake Bay for radiological analysis. Figure 2-1 presents the Chesapeake Bay study area and sampling sites for monitoring releases from CCNPP. In this report both "plant site" and "nearfield" refer to the sampling area in the immediate vicinity of CCNPP. "Kenwood Beach" and "farfield" refer to the sampling area 12 km north of CCNPP.

Table 2-1. Environmental samples for radiological analysis collected from Chesapeake Bay in the vicinity of CCNPP, 1991-1994

Sample Media Collected	Collection Frequency	Number of Sampling Locations
Sediments	Quarterly	28
Oysters		
Natural bar*	Quarterly	1
Tray	Quarterly	2
	Semi-annually	2
	Tri-quarterly	2
	Annually	2

* Natural bar oysters were not collected after 1992.

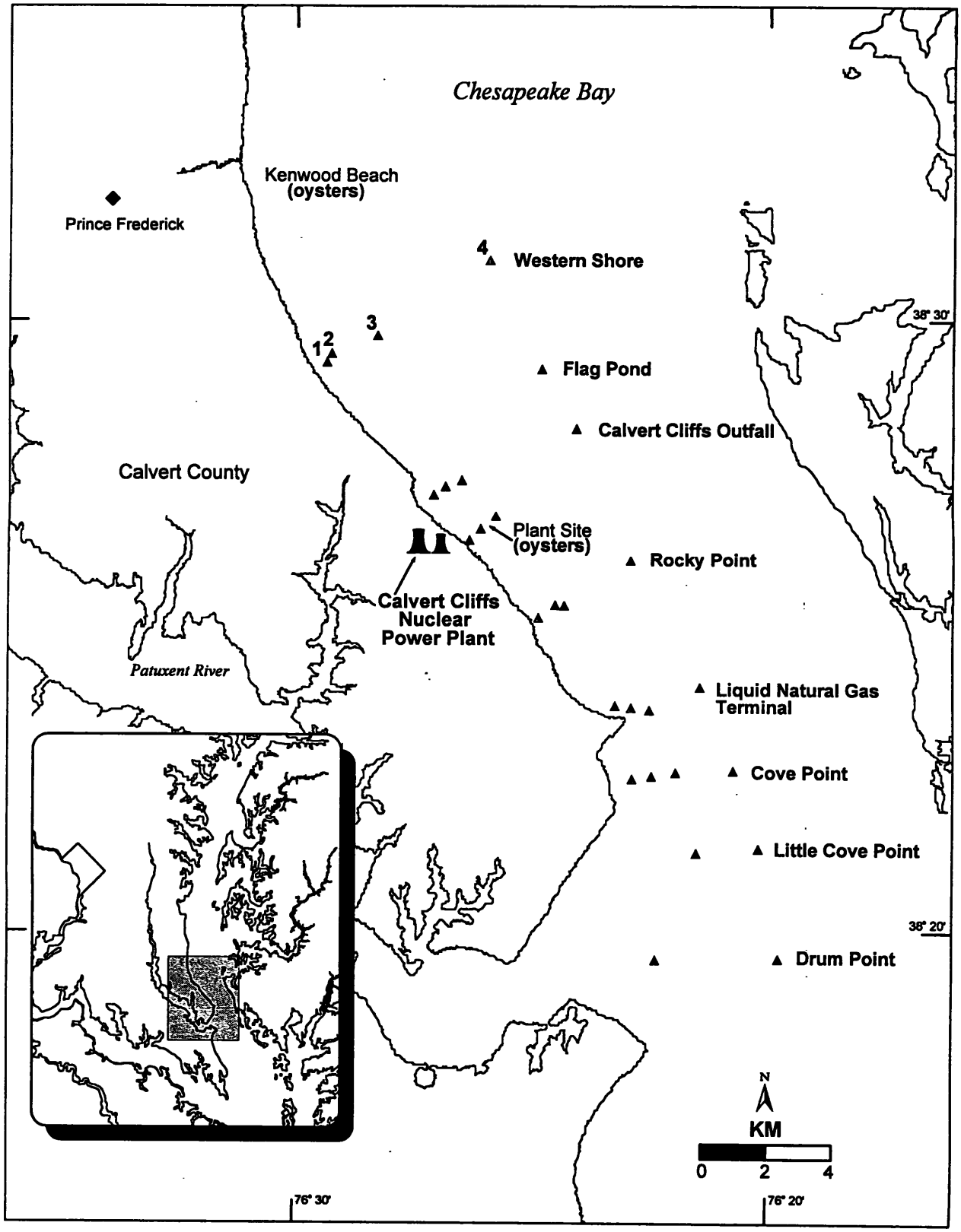

Figure 2-1. Transects and stations for samples collected from Chesapeake Bay. Appendix A contains a list of coordinates for all stations.

2.1.1 Sediments

Sediments were collected quarterly from a grid of transects north and south of CCNPP. Transects were designated as Western Shore (WS 1-4), Flag Pond (FP 1-4), Calvert Cliffs Outfall (CCO 1-4), Rocky Point (RP 1-4), Liquid Natural Gas Terminal (LNG 1-4), Cove Point (CP 1-4), Little Cove Point (LCP 1-2), and Drum Point (DP 1-2; Figure 2-1). All sediments were collected using a hydraulic box grab. The top 10 cm (or less) of sediment was recovered from each grab until approximately 3 liters of sediment was collected at each station.

2.1.2 Biota

The only biota collected for radiological analysis were oysters. Natural bar oysters were collected from a bed approximately 1.2 km north of the CCNPP cooling-water outfall by towing a commercial dredge. Only oysters which met regulations, such as size requirements, for consumption, were sampled.

For the tray oyster study, mature oysters were placed into partitioned trays (Abbe 1981) and submerged for a variety of exposure periods. Trays were placed 0.4 km north of the CCNPP cooling-water outfall and were supported by a platform resting approximately 0.5 m from the bottom. Each tray had four compartments designed to hold 50 oysters each. Oysters from individual compartments (50 per group) were retrieved and restocked on a schedule designed to evaluate radionuclide concentrations in oysters exposed to CCNPP discharges for 3, 6, 9, and 12 month periods.

2.2 MEASUREMENT OF GAMMA-EMITTING RADIONUCLIDES IN BIOTA AND SEDIMENTS

2.2.1 Sample Preparation

Samples were prepared for analysis as follows:

Oyster flesh: Samples were homogenized in a Waring blender, diluted to 1 or 2 liters with deionized water, and preserved in a 10% solution of formaldehyde. The homogenized flesh was placed in a 1 or 2-liter Marinelli beaker and analyzed for radionuclide content using gamma spectrometry.

Sediment: Sediment samples were inspected visually, placed in a 2-liter Marinelli beaker and analyzed for radionuclide content using gamma spectrometry. After counting, drying, and weighing, sediment samples were analyzed for particle size (Section 2.3) to determine their composition (i.e., sand, silt, or clay).

2.2.2 Gamma Spectrometry

During 1991 through 1993, the gamma-ray counting system consisted of two high-resolution germanium-lithium [Ge(Li)] coaxial detectors and one intrinsic (high-purity) germanium [HPGe] coaxial detector coupled to a 4096-channel ND9900 pulse-height analysis system (Nuclear Data, Inc., Schaumburg, IL). The germanium-lithium detectors, manufactured by Ortec (Ortec, Inc., Oak Ridge, TN) and Princeton Gamma-Tech (Princeton Gamma-Tech, Princeton, NJ) were 13% and 16% efficient respectively. The intrinsic germanium detector was manufactured by Ortec and was 25% efficient. During 1994, the counting system employed two intrinsic germanium detectors, one each manufactured by Ortec and Canberra (Canberra, Inc., Meriden, CT). The detectors were 25% and 23% efficient respectively.

Files containing appropriate energy calibrations, nuclide libraries, and geometries and counting efficiencies by sample were used to produce reports of sample activity. Gamma-ray energies for peak regions of interest were taken from Heath (1977) and Smith and Wollenberg (1972). Calculations used in nuclide libraries employed gamma-ray intensity values compiled by Heath (1977), Kocher (1977), and Smith and Wollenberg (1972).

During 1991 through 1993, counting efficiencies for the various geometries and kinds of samples were determined by internal spiking with radionuclide standards of wide energy range. The standards, which were supplied by the U.S. Environmental Protection Agency, were traceable to standards maintained by the National Institute of Standards and Technology (NIST). During 1994, counting efficiencies were determined using custom multi-gamma standards commercially purchased from Analytics, Inc., Atlanta, GA, which were traceable to NIST. All spectra were acquired for 1000 min. Sample activities were corrected to collection date. Spectra for selected samples were stored permanently electronically for future reference.

Mean thorium and uranium concentrations were estimated from direct measurement of the activity of selected daughter radionuclides and based upon the assumption that all daughter radionuclides were in secular equilibrium with their parents. Direct measurement of the activity of ^{208}Tl (583 keV peak) and ^{214}Bi (609 keV peak) was used to estimate total thorium and uranium concentrations (as μg/g sample). Element concentrations were then converted to activities (pCi/kg) using the following specific activities: One ppm U is approximately equal to 720 pCi of uranium nuclides/kg of sample and one ppm Th is approximately equal to 110 pCi of ^{232}Th/kg of sample.

Radionuclide concentrations and pertinent sample-collection information and analysis parameters were entered into a SAS (Statistical Analysis System, Cary, NC.) computer database according to established procedures (Domotor 1986; Frithsen et al. 1996). SAS software was used to analyze and interpret radiological results, model radionuclide concentrations in selected biota and sediments, and generate reports.

2.2.3 Quality Assurance

Spiked "cross-check" samples were received periodically from the Radiochemical and Drinking Water Quality Assurance Program (RADQA), Analytical Sciences Branch, United States Environmental Protection Agency (USEPA) to evaluate the performance of laboratories participating in its intercomparison study program. The results of laboratory analyses were used internally to track instrument performance; if laboratory results fell outside of USEPA uncertainties, the cause of the anomaly was investigated and data from environmental sample analyses were examined for the presence of bias. Laboratory results and USEPA values for the intercomparison study samples are given in Appendix B.

2.3 DETERMINATION OF SEDIMENT CHARACTERISTICS

The size of sediment particles was measured to provide a basis for comparing radionuclide concentrations detected in sediments of different composition (e.g., sand vs. clay). Sediment particle size analysis takes into account composition changes which may affect measured radionuclide concentrations at a collection site. Sediments were classified as silt-clay if the mean grain size was less than 63 μm. Sediments were classified as sand if the mean grain size was greater than 63 μm (Wentworth scale as published in Buchanan and Kain 1971). Mean grain size was determined by wet- or dry-sieving a 50 g (dry weight) aliquot through 250 μm, 125 μm, and 63 μm mesh. Each fraction was dried and weighed. That portion passing through the 63 μm screen was determined by subtraction from the original 50 g. Sample particle size index values were arrived at by multiplying the fraction percentage of the total weight by four for that retained on the 250 μm mesh, by five for the 125 μm mesh, by six for the 63 μm mesh and by seven for the fraction passing through the 63 μm screen. The sum of these products is the relative particle size index for the sediment sample and ranges from the most coarse, 400 value, where all material is retained on the 250 μm screen, to the most fine, 700 value, where all material passes through the 63 μm screen.

2.4 DATA ANALYSIS

Analytical results were tabulated using computerized gamma spectrum analysis software. When a photopeak was encountered by the software, the corresponding radionuclide was identified and quantified, based on such factors as instrument conditions, volume of sample, and radioactive decay. The activity of a radionuclide of interest is reported as a value with a 2σ uncertainty.

For radionuclides of interest which were found not to be present, the lower limit of detection (LLD) was calculated. For data included in this report, the LLD is defined by the equation given in Table 2-2. Common LLD quantities produced by sample analyses are given in Table 2-3. For the purpose of summarizing data, LLD quantities are disregarded when yearly and overall averages of activity values are calculated.

Table 2-2. Determination of the lower limit of detection.

$$LLD = \frac{2m\sqrt{B}}{T*V*E*2.22*e^{-\lambda\Delta t}}$$

where

B	=	The background counts in the region of interest
m	=	2.327 (based on a Poisson distribution at a confidence level of 99%)
T	=	The sample counting time in minutes
V	=	The mass or volume of sample, in kilograms
E	=	Net system efficiency of counter at the energy region of interest
2.22	=	Disintegrations per minute (dpm) per picocurie (pCi)
λ	=	The radioactive decay constant for the particular radionuclide
Δt	=	The elapsed time between sample collection and counting

Table 2-3. Approximate lower limits (99%) of detection for selected counting geometries (pCi/kg) using a 2-liter Marinelli beaker except as indicated

Radionuclide	Energy (keV)*	Biota (1l) (1 kg wet)	Biota (2 kg wet)	Sand (3 kg dry)	Clay (1.5 kg dry)
^{7}Be	477	80	34	50	110
^{58}Co	811	9	4	6	11
^{60}Co	1173	9	4	5	15
^{95}Zr	757	16	6	12	22
^{95}Nb	766	8	4	8	13
^{103}Ru	498	10	4	10	13
^{106}Ru	622	80	32	50	100
^{110m}Ag	884	9	5	6	14
^{125}Sb	428	28	10	12	32
^{134}Cs	605	9	4	6	12
^{137}Cs	662	11	5	6	12
^{144}Ce	134	60	21	40	77

* keV = thousand electron-volts.

2.5 DETERMINATION OF POWER PLANT CESIUM-137

Cesium-137 is a constituent of both historic weapons test fallout and aqueous effluent from nuclear power plants. The activity of power plant ^{137}Cs is determined by observing ^{134}Cs activity in the environmental sample. Cesium-134 is chemically identical to ^{137}Cs and both are released in a generally consistent ratio over time. Following a decay correction of observed ^{134}Cs in the environmental sample to the time of release, the ^{134}Cs activity is multiplied by the release ratio of ^{137}Cs to ^{134}Cs in aqueous effluent to estimate the quantity of power plant ^{137}Cs in a sample. If ^{134}Cs is not present in the sample, then the entire activity of ^{137}Cs is assumed to be the result of weapons test fallout. The detection limits of power plant ^{137}Cs are higher than fallout-related ^{137}Cs since its activity is dependent on the detection of ^{134}Cs, which has a higher detection limit due to its short half-life in relation to ^{137}Cs. Because of the elevated probability of false-negatives, power plant ^{137}Cs is likely to be under-estimated.

2.6 DATA PRESENTATION

The appendix contains data for the radionuclides detected in the environmental samples collected in the vicinity of CCNPP during the 1991 through 1994 monitoring period. The radionuclides reported in these tables include the naturally occurring radionuclides ^{7}Be and ^{40}K, and the power plant produced radionuclides ^{110m}Ag, ^{58}Co, ^{60}Co, ^{134}Cs, ^{137}Cs, ^{95}Nb, ^{65}Zn, and ^{95}Zr. Separate tables are provided for sediments, oysters (*Crassostrea virginica*), and epifauna (various species). Within each table, specific sample stations are arranged approximately north to south and data are presented by quarter along with annual and overall means for the entire four-year monitoring period.

Data are decay corrected to the date of sample collection. Counting error is reported as ± 2-sigma error. Concentrations for radionuclides of interest that were not detected in specific samples were recorded as less than (LT) the lower limit of detection for that sample as determined by spectrum analysis programs.

3.0 RESULTS AND DISCUSSION

Plant discharge and monitoring data collected during 1991 through 1994 were used to complete assessments to identify and quantify sources of radionuclides, determine the concentration of radionuclides in environmental samples, and estimate potential radiological risks to ecological resources and human health. The results of these assessments are presented in separate sections below.

The origins of more commonly observed radionuclides in environmental samples were identified to assess the impact of CCNPP-related radionuclide releases relative to natural or fallout-related radionuclides. The quantities of individual radionuclides released from CCNPP during 1991 through 1994 are provided to compare to quantities observed in environmental samples collected during the same period. Curie and millicurie levels of **environmentally significant** radionuclides discharged by CCNPP into the aqueous pathway generally translate into picocurie quantities of CCNPP-related radionuclides in environmental samples.

3.1 SOURCES OF RADIONUCLIDES

Nature, atmospheric tests of nuclear weapons, and discharges from CCNPP are the three primary sources of radioactive material in the Chesapeake Bay in the vicinity of CCNPP. Radioactivity attributable to each of these sources was detected in samples of biota and sediment collected from 1991 through 1994 (Table 3-1).

3.1.1 Radionuclides from CCNPP

The USNRC regulates normal operational releases of radionuclides from nuclear power plants. Quantities of releases from CCNPP were obtained from BGE's semi-annual reports to the USNRC (BGE 1992-1995). Table 3-2 shows that CCNPP released between 800 curies (Ci) and 7,650 Ci annually into the Chesapeake Bay in the form of radioactive gaseous and liquid effluents. Differences between years were attributable to routine changes in plant operations. Liquid radioactive wastes are discharged through the cooling-water outfall approximately 0.3 km offshore, where they are diluted with the receiving bay water.

Atmospheric releases of noble gases comprised 68% of the radionuclides released from CCNPP between 1991 and 1994. Noble gases are chemically inert, are not readily incorporated into biological tissues, and are not bioconcentrated. They are dispersed in the environment and generally have short half-lives, decaying rapidly to stable forms. Predominantly aqueous releases of tritium comprised another 32% of the radioactive material emitted during the period. Dispersion and dilution within the environment rapidly reduce tritium concentrations to background levels (MDE 1996). The remaining radionuclides, which constituted less than 1% of the plant's total radioactive releases, included radioiodines and other radionuclides that are considered environmentally significant. Environmentally significant radionuclides are those that have a strong tendency to adsorb onto particles, can accumulate in biological

Table 3-1. Sources for radionuclides potentially present in environmental samples

Radionuclide	Natural	Weapons	Power Plant
^{110m}Ag			x
^{140}Ba			x
^{7}Be	x		
^{14}C	x	x	x
^{141}Ce		x	x
^{144}Ce		x	x
^{58}Co			x
^{60}Co		x	x
^{51}Cr			x
^{134}Cs			x
^{136}Cs		x	x
^{137}Cs		x	x
^{55}Fe			x
^{59}Fe			x
^{3}H	x	x	x
^{131}I			x
^{133}I			x
^{40}K	x		
^{140}La			x
^{54}Mn			x
^{95}Nb		x	x
^{97}Nb			x
^{147}Nd			x
^{239}Pu			x
^{103}Ru		x	x
^{106}Ru		x	x
^{124}Sb			x
^{125}Sb		x	x
^{113}Sn			x
^{89}Sr		x	x
^{90}Sr		x	x
^{129}Te			x
^{232}Th series	x		
^{238}U and ^{235}U series	x		
^{133}Xe		x	x
^{135}Xe			x
^{95}Zr		x	x
^{65}Zn			x

tissues, and potentially be concentrated through trophic transfer. Figure 3-1 shows the relative contributions of noble gases, tritium, and environmentally significant radionuclides in releases from CCNPP between 1991 and 1994.

Table 3-2. Annual releases (curies) from all pathways of noble gases, tritium, iodines, and particulates from CCNPP, 1991-1995. Source: BGE 1992-1995.

	Total	Noble Gases	Tritium	Iodines and Particulates
1991	3,615.07	2,582.21	1,031.22	1.64
1992	7,654.37	5,871.10	1,781.79	1.48
1993	876.63	214.22	660.58	1.83
1994	799.82	144.51	654.25	1.06
Total	12,945.89	8,812.04	4,127.84	6.01

From 1991 through 1994, CCNPP released 5.8 Ci of radioiodines and other environmentally significant radionuclides to the Chesapeake Bay in the form of aqueous discharge and another 0.2 Ci as atmospheric discharge. Table 3-3 lists the principal environmentally significant radionuclides released via the aqueous pathway, the quantities of each released from 1991 through 1994, and their half-lives. Radionuclides which have longer half-lives, such as ^{60}Co (half-life = 5.3 years), have the potential to persist longer than shorter lived radioisotopes in the environment. Table 3-3 also identifies which of these radionuclides were predominantly found in samples of sediment and biological samples. The radionuclides released by CCNPP into the Chesapeake Bay in the greatest abundance during the four-year monitoring period were ^{137}Cs, ^{58}Co, and ^{134}Cs.

Figures 3-2 through 3-6 depict historical trends in the yearly quantities of CCNPP's aqueous releases of certain environmentally significant radionuclides. Radiocesium and ^{58}Co releases have been trending downward since about 1980 while radiosilver and ^{60}Co, which are released in relatively smaller quantities, show no apparent trend.

3.1.2 Natural Radionuclides

Natural sources of radiation are present everywhere. Principal naturally occurring radionuclides that result in measurable radiological doses to human populations include ^{40}K, ^{232}Th, and ^{238}U. Thorium and uranium each initiate a decay series of radioactive progeny (those which emit gamma rays) that were detected in nearly all samples of biota and sediment from CCNPP. These radionuclides generally are found in very small concentrations; however, ^{40}K (half-life = 1.26×10^9 yr) is abundant and is present nearly everywhere in the environment.

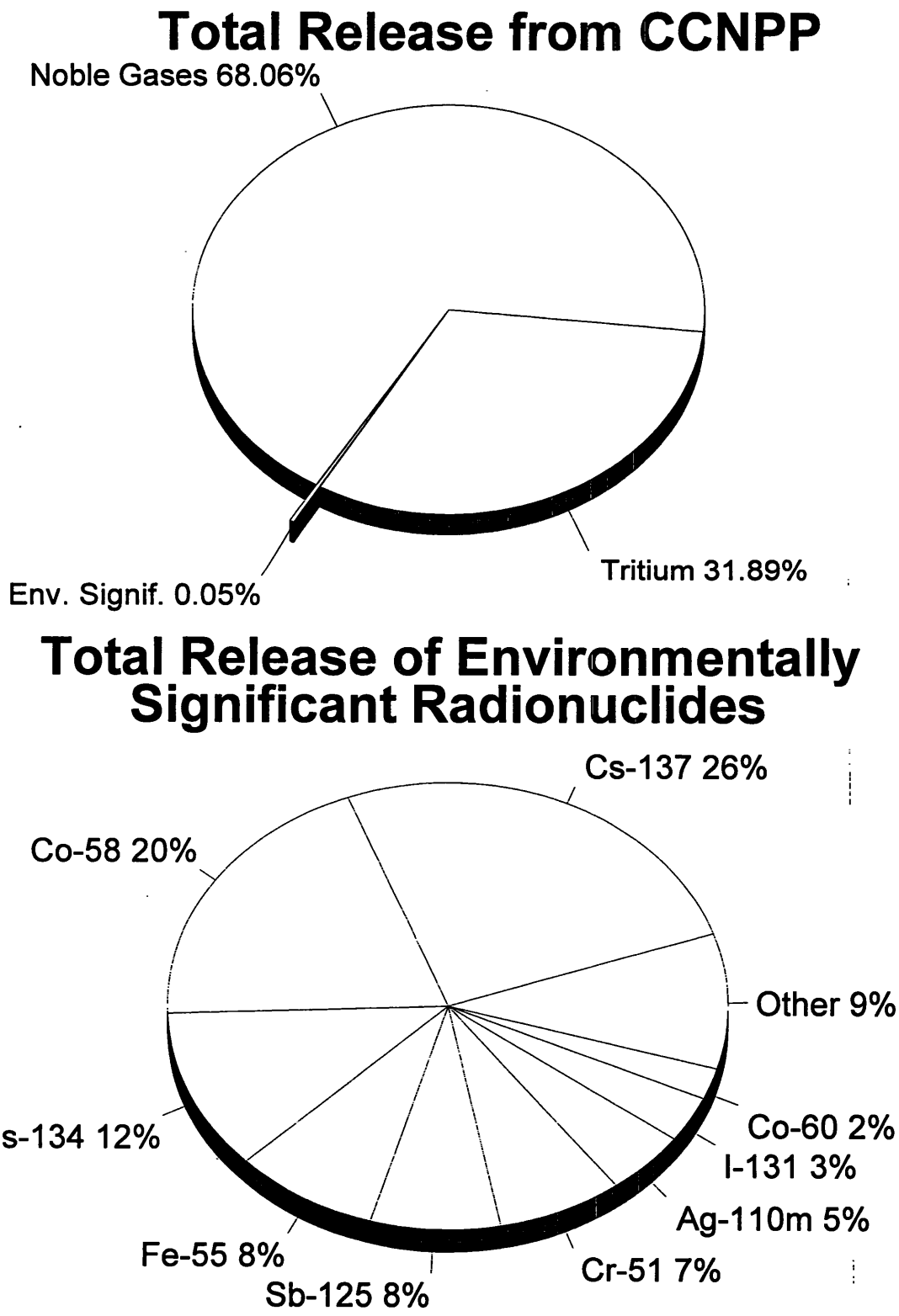

Figure 3-1. Relative contributions of noble gases, tritium, and environmentally significant radionuclides released from CCNPP, 1991-1994. Noble gases include atmospheric and dissolved gases.

Cosmic rays produce several radionuclides in the atmosphere (Whicker and Schultz 1982). Of these, ^{7}Be was detected frequently in sediments and occasionally in biota from CCNPP; however, the natural production of ^{7}Be (half-life = 53 d) in the atmosphere contributes only a small portion of the total radiation dose from natural background.

Table 3-3. Quantities of environmentally significant radionuclides released from CCNPP via the aqueous pathway during the period, 1991-1994. Source: BGE 1992-1995.

Radionuclide	Half-life	Quantity (Ci)	Sediment	Biota
^{137}Cs	30.2 years	1.49	yes	yes
^{58}Co	70.8 days	1.16	yes	yes
^{134}Cs	2.1 years	0.67	yes	no
^{55}Fe	2.7 years	0.48	no	no
^{125}Sb	2.8 years	0.44	yes	no
^{51}Cr	27.7 days	0.42	yes	no
^{110m}Ag	249.9 days	0.28	yes	yes
^{131}I	8.0 days	0.18	no	no
^{60}Co	5.3 years	0.14	yes	yes
^{95}Nb	35.1 days	0.13	yes	no
^{133}I	20.8 hours	0.09	no	no
^{95}Zr	64.0 days	0.07	no	no
^{106}Ru	368.2 days	0.04	yes	no
^{124}Sb	60.2 days	0.03	no	no
^{144}Ce	284.3 days	0.03	yes	no
^{59}Fe	44.6 days	0.02	no	no
^{103}Ru	39.4 days	0.02	no	no
^{54}Mn	312.7 days	0.02	no	no
^{97}Nb	72.1 min.	0.02	no	no
^{113}Sn	115.1 days	0.02	no	no
^{129}Te	69.6 min.	0.02	no	no
^{140}La	40.2 hours	0.01	no	no
^{89}Sr	50.6 days	0.01	no	no
^{136}Cs	13.2 days	<0.01	no	no
^{140}Ba	12.8 days	<0.01	no	no
other*	---	<0.001	no	yes

Note:
yes = detected in samples
no = not detected in samples
* = includes ^{65}Zn (half-life = 275 days)

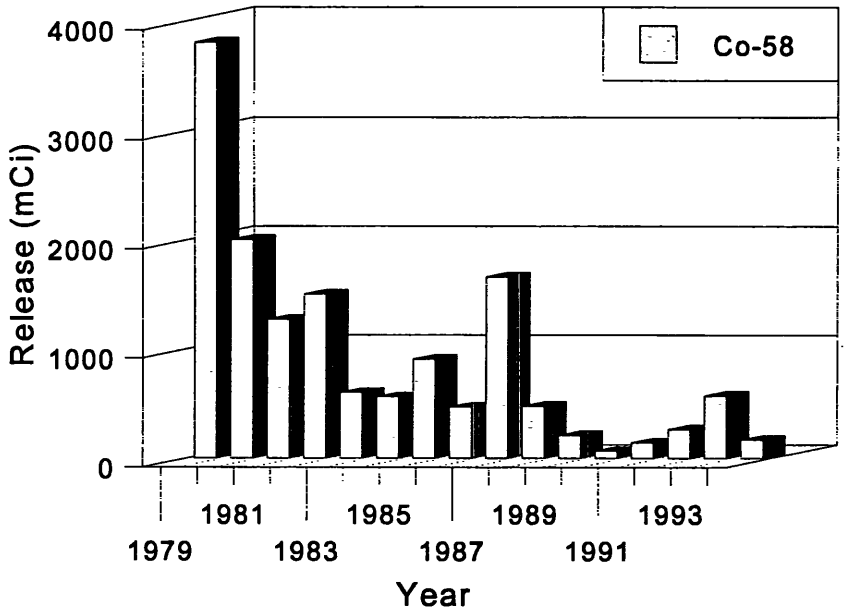

Figure 3-2. Annual aqueous releases of ^{58}Co from CCNPP, 1979-1994. Source: BGE 1980-1995.

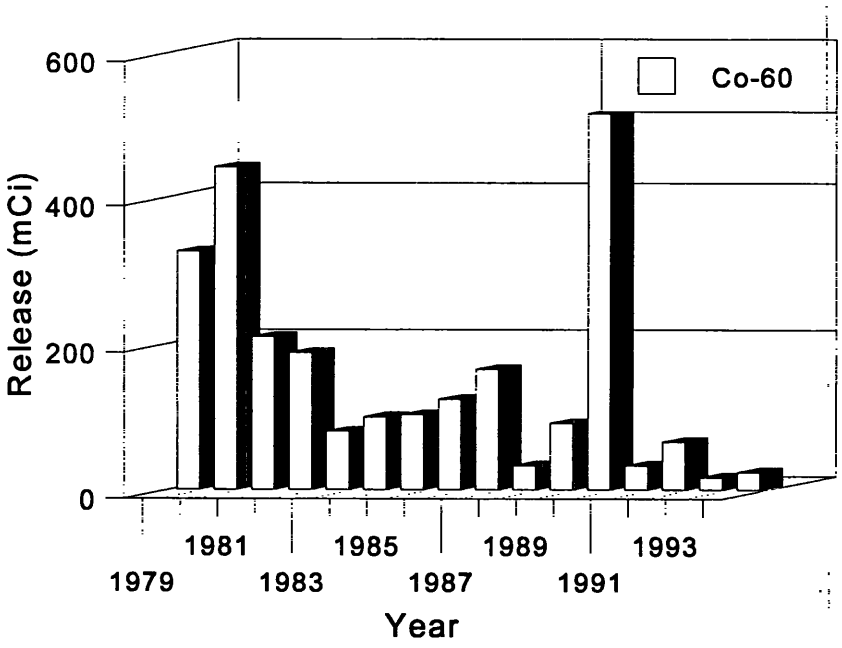

Figure 3-3. Annual aqueous releases of ^{60}Co from CCNPP, 1979-1994. Source: BGE 1980-1995.

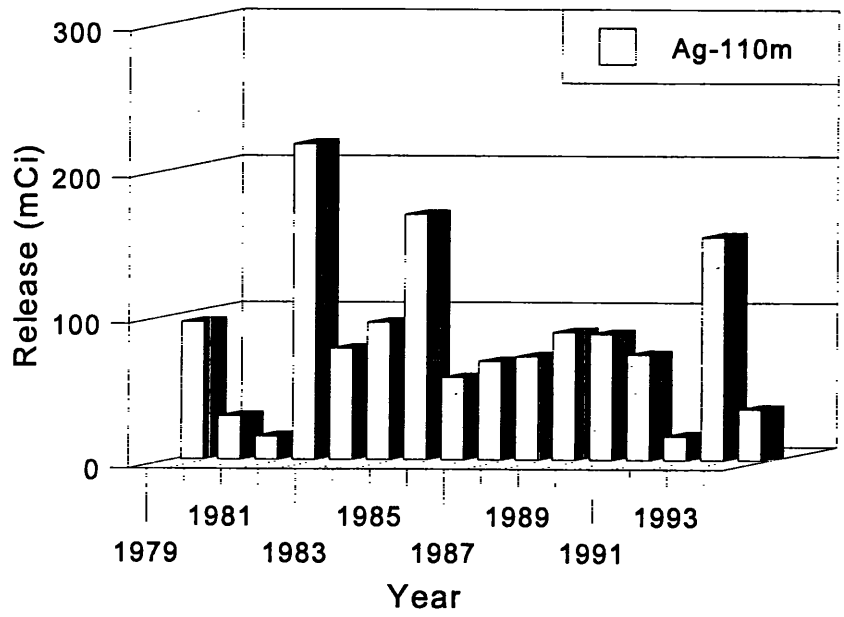

Figure 3-4. Annual aqueous releases of ^{110m}Ag from CCNPP, 1979-1994. Source: BGE 1980-1995.

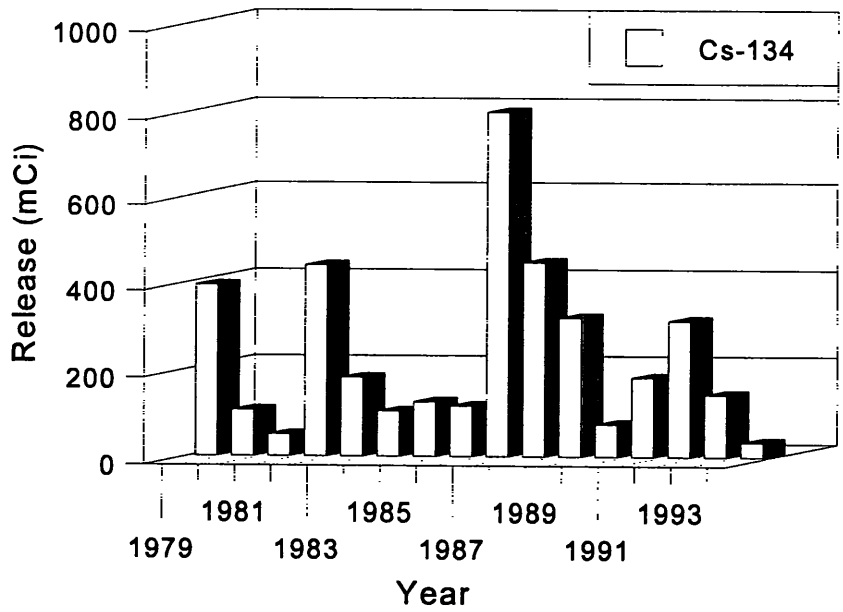

Figure 3-5. Annual aqueous releases of ^{134}Cs from CCNPP, 1979-1994. Source: BGE 1980-1995.

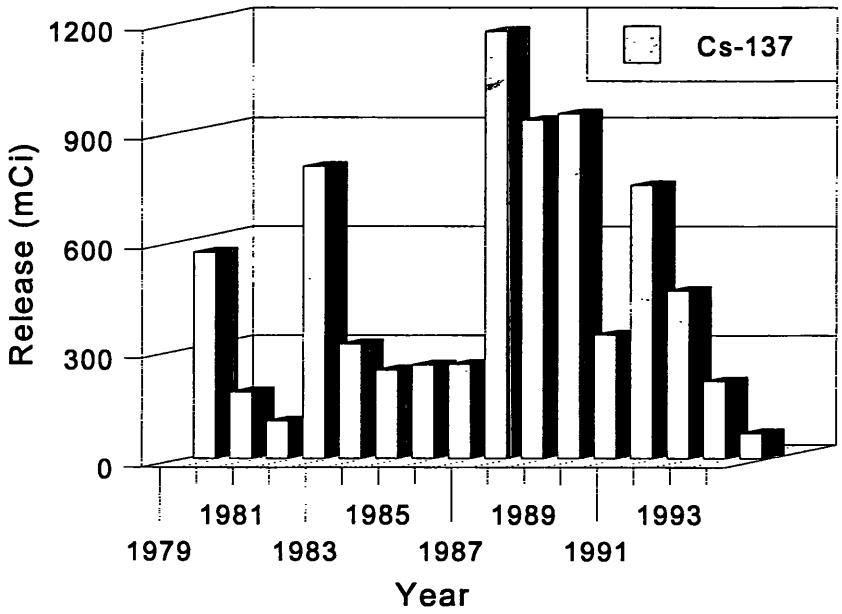

Figure 3-6. Annual aqueous releases of ^{137}Cs from the CCNPP, 1979-1994. Source: BGE 1980-1995.

3.1.3 Radionuclides from Weapons Tests

Atmospheric tests of nuclear weapons, conducted until 1980, have introduced a variety of man-made radionuclides into the environment. Cesium-137, a fallout radionuclide with a half-life of 30 years, was the only radionuclide attributable to weapons testing detected during the monitoring period.

3.1.4 Comparisons to Peach Bottom Atomic Power Station

The two principal sources of power plant produced radionuclides in environmental media collected in Maryland are CCNPP and the Peach Bottom Atomic Power Station (PBAPS) in Pennsylvania. Both plants released noble gases, tritium, and environmentally significant radionuclides (iodines and particulates). All releases of radionuclides from CCNPP and PBAPS were the result of normal plant operation and maintenance procedures and were within regulatory limits established by the USNRC. Compared with PBAPS, CCNPP released 73% less radioactive material during the 1991 through 1994 monitoring period (Figure 3-7). Noble gases comprised 99% of the radionuclides released from PBAPS whereas 68% of all releases from CCNPP were noble gases. Additionally, the release of tritium from CCNPP was almost twenty-eight times greater than tritium releases from PBAPS. These differences are a reflection of plant design; CCNPP has a pressurized water reactor whereas PBAPS has a boiling water reactor.

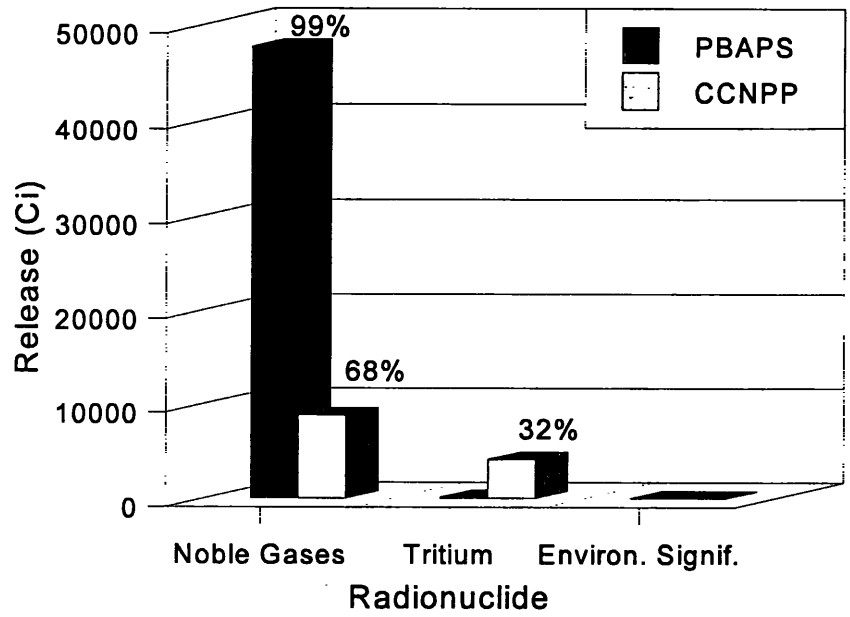

Figure 3-7. Annual releases of noble gases, tritium and environmentally significant radionuclides from CCNPP and PBAPS, 1991-1994. Noble gases include atmospheric and dissolved gases. Environmentally significant radionuclides include iodines and particulates.

3.2 RADIONUCLIDES IN ENVIRONMENTAL SAMPLES

3.2.1 Sediments

Sediments serve as sinks for both stable and radioactive metals. Suspended particulate material can scavenge metals through flocculation and adsorption, or the surface layer of bottom sediments may sorb metals directly from the water column (Santschi et al. 1983). Because of these processes, sediments accumulate radionuclides over time. Sediments collected in the vicinity of CCNPP have been used since 1975 to identify the fate and behavior of released radionuclides through measurement of the spatial and temporal patterns of radionuclide concentrations caused by physical transport of radionuclides and intra-annual variability in the release of radionuclides from the plant. PPRP's monitoring results for sediment collected between 1991 and 1994 are summarized below. Where relevant, radionuclide concentrations detected in sediments are compared with levels observed during previous reporting periods. Appendix C presents concentrations of selected radionuclides detected in all of the sediment samples collected between 1991 and 1994.

A variety of factors influence the concentrations of radionuclides in sediments. These include: rate of input, distance from the power plant, half-life of the radionuclide, natural estuarine processes such as sedimentation, circulation, and bioturbation, depth of the sediment layer from the water surface, and sediment grain size. Sediment grain size was the only factor specifically analyzed for this report. Sediments collected at inshore stations were composed predominantly of sand; sediments from offshore stations, which are located in water depths greater than 8 m, were mostly clay. Figure 3-8 shows mean particle size values for sediment collected from Chesapeake Bay between 1991 and 1994.

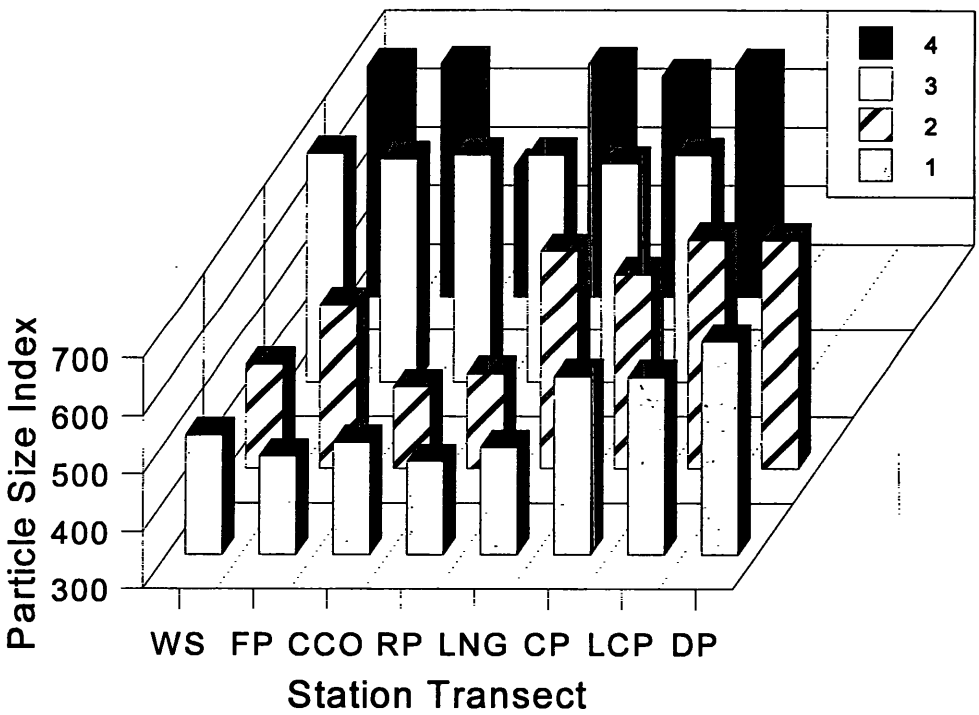

Figure 3-8. Mean particle size values for sediments collected from Chesapeake Bay, 1991-1994.

Radionuclides from natural sources (^{7}Be, ^{40}K, Th and U decay series), weapons-test fallout (^{137}Cs), and CCNPP discharges (^{60}Co) were generally detected at higher concentrations in clay sediments than in sand sediments during 1991-1994 (Figures 3-9 through 3-11). Radionuclides have a greater affinity for clay, rather than sand, due to the former's fine crystalline structure, greater surface area, and the higher cation exchange capacity of clay particles (Eisenbud 1987). Sandy sediments are coarser and less able to sorb radionuclides (Olsen et al. 1989).

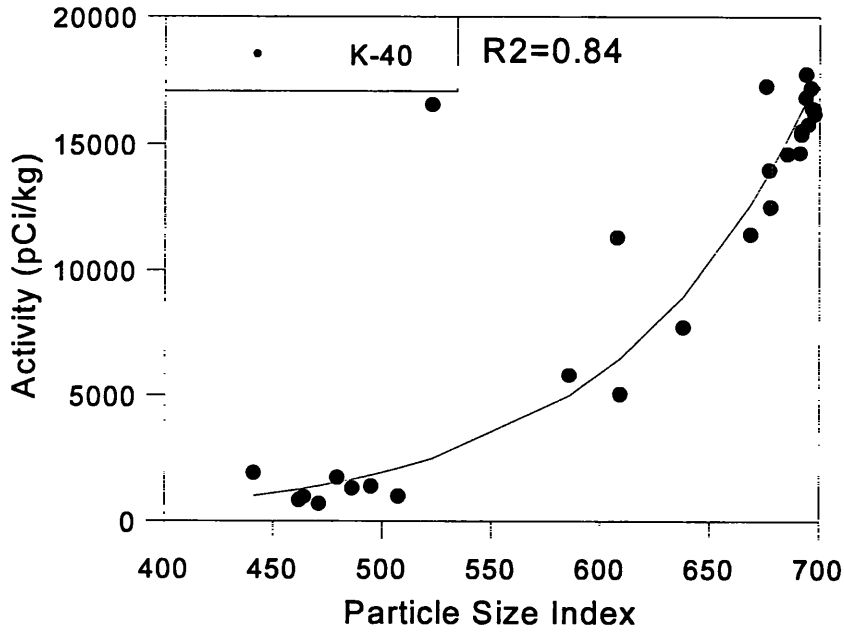

Figure 3-9. Relationship between ^{40}K activity and particle size index.

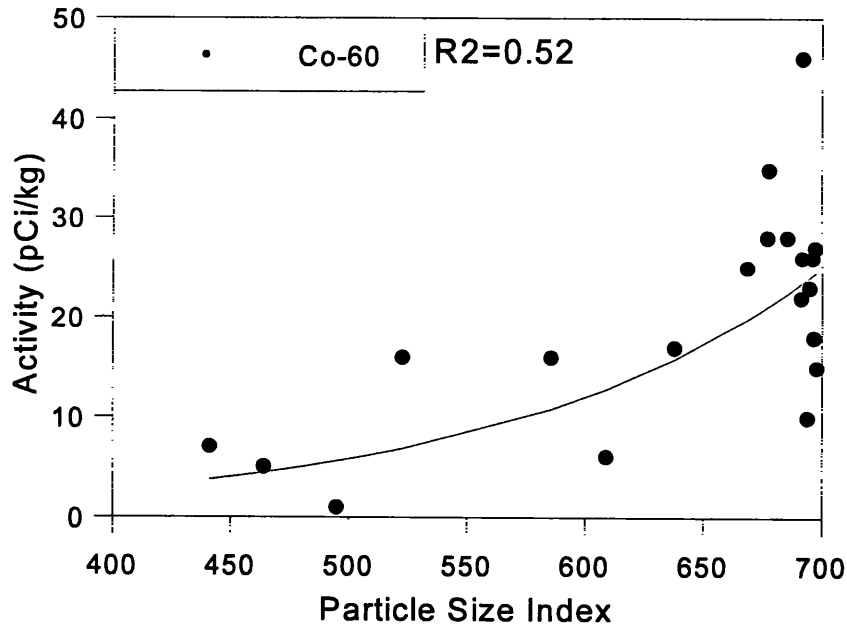

Figure 3-10. Relationship between ^{60}Co activity and particle size index.

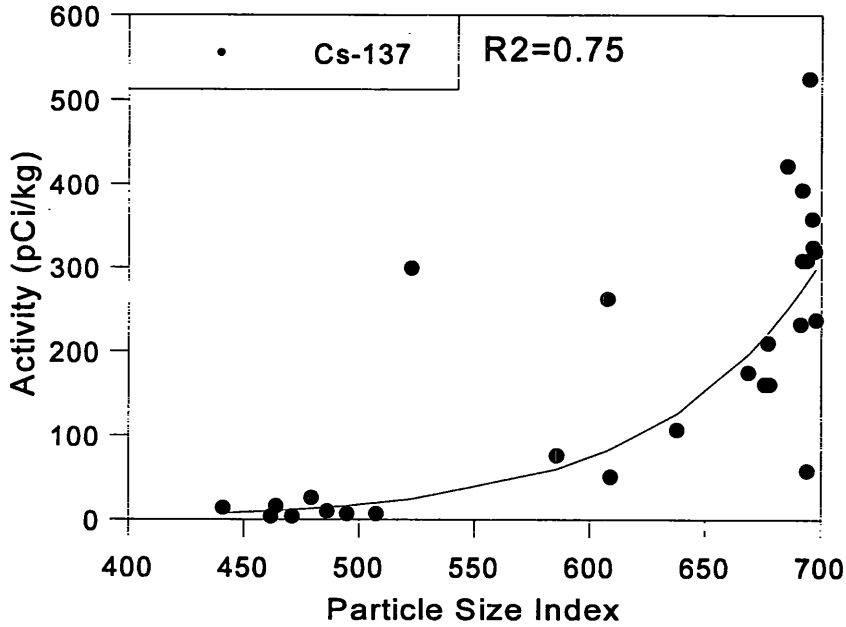

Figure 3-11. Relationship between ^{137}Cs activity and particle size index.

3.2.1.1 Radionuclides from CCNPP

Figure 3-12 shows the environmentally significant radionuclides found most frequently in sediment samples from the vicinity of CCNPP. Cobalt-60 was found in 38% of sediment samples. Other radionuclides were found in less than 6% of sediment samples. Cobalt-60, ^{58}Co, and ^{110m}Ag (in order of detection frequency) were the three primary CCNPP-related radionuclides detected in sediments between 1991 and 1994. Other power-plant associated radionuclides were detected in a small number of samples in a random pattern over the entire study area.

Cesium-137. Because ^{134}Cs and ^{137}Cs are chemically identical, the presence of ^{134}Cs (which is solely attributable to CCNPP discharges) in sediment samples suggests that some fraction of the ^{137}Cs in sediment samples collected during the monitoring period was CCNPP-related. The yearly release rates of ^{134}Cs and ^{137}Cs from the power plant appear to rise and fall in tandem, lending support to the correlation between ^{134}Cs detection and power-plant sourced ^{137}Cs deposition (Figure 3-13).

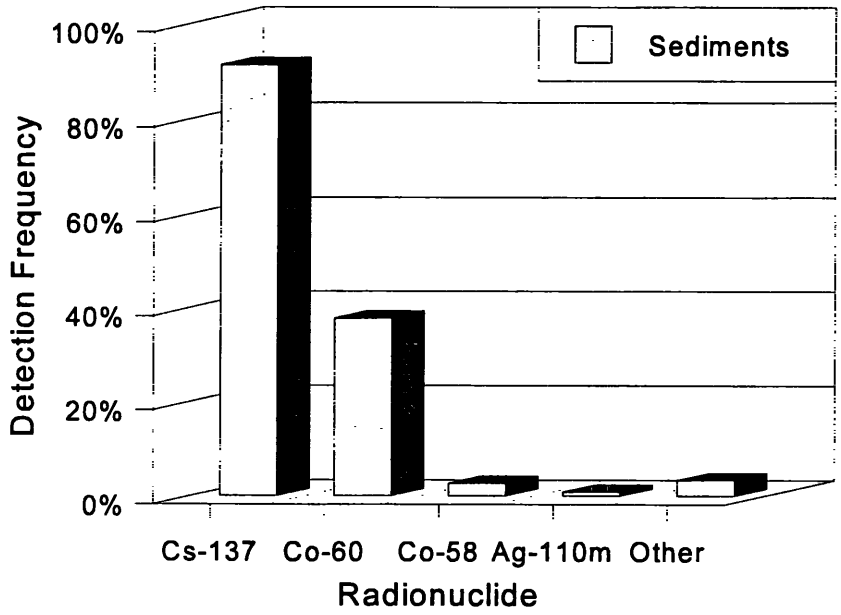

Figure 3-12. Radionuclides detected in sediment samples collected from Chesapeake Bay, 1991-1994. The category "other" includes ^{95}Nb, ^{125}Sb, ^{65}Zn, ^{134}Cs, ^{137}Cs, ^{51}Cr, ^{106}Ru, and ^{144}Ce.

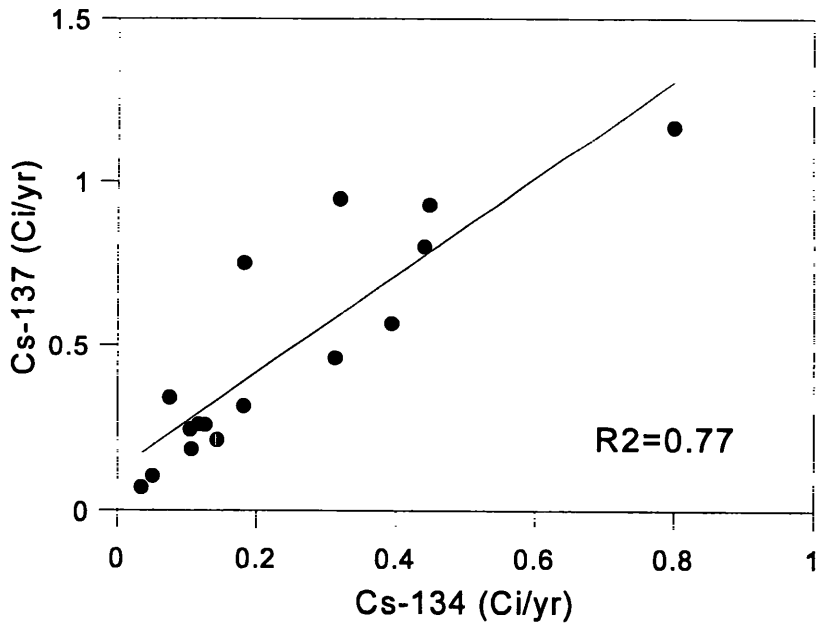

Figure 3-13. Relationship of ^{134}Cs release to ^{137}Cs release, 1979-1994.

Cesium-134 was detected in just one sediment sample in the entire monitoring period, suggesting that in the current monitoring period, CCNPP-related ^{137}Cs made up an insignificant proportion (less than 0.3 %) of ^{137}Cs already in sediment. The ^{137}Cs present in sediment samples was either residual power-plant produced radionuclide or, more likely, fallout related (see Section 3.2.1.3).

Cobalt-60 and ^{58}Co were detected at transects generally south of the plant, but dispersion north of the plant (Western Shore transect stations 2, 3, and 4) due to tidal transport and estuarine circulation has been evident in previous monitoring periods (Domotor and McLean 1987).

Cobalt-60 continues to be the primary power plant-related radionuclide detected in sediments. Both the incidence and activity of ^{60}Co in sediments show a downward trend in comparison to previous reporting periods. The downward trend at many stations appears to be the result of physical decay. The activity of ^{60}Co in bay sediment appears constant at CCO-3 (near the power plant outfall) over the entire monitoring period, however, suggesting an equilibrium state (the rate of influx of ^{60}Co is balanced with the decay of the radionuclide and other natural processes such as sedimentation). CCNPP contributions of ^{60}Co probably continued to occur at this transect.

Small concentrations of ^{58}Co were detected in 3% of the sediments collected from 1991 through 1994. The number of samples containing ^{58}Co declined noticeably during this monitoring period. This suggests decreased ^{60}Co contributions due to the chemical similarity of the two isotopes, however, the quantity of ^{60}Co discharged from the plant in this time period was approximately one-fifth the ^{58}Co quantity. There was a relatively high incidence of ^{58}Co detected at CCO-2, which supports our assertion that radiocobalt deposition continued to occur in detectible quantities at the outfall, but was not evident elsewhere, except for LNG-2.

Silver-110m was detected in less than 1% of sediments collected between 1991 and 1994. The incidence of radiosilver detection in the current monitoring period decreased from the 1987 to 1990 monitoring period. Silver-110m was detected twice at small concentrations at down-bay transects during both 1991 and 1994, generally following periods relatively high emission of ^{110m}Ag from the power plant. These emissions, however, were small in relation to other environmentally significant radionuclides.

3.2.1.2 Natural Radionuclides

The major component of sediment radioactivity were the naturally occurring radionuclides and included various radionuclides of the thorium and uranium decay chains, ^{40}K, and ^{7}Be (Figure 3-14). These radionuclides were responsible for over 95% of the radioactivity found in all environmental samples.

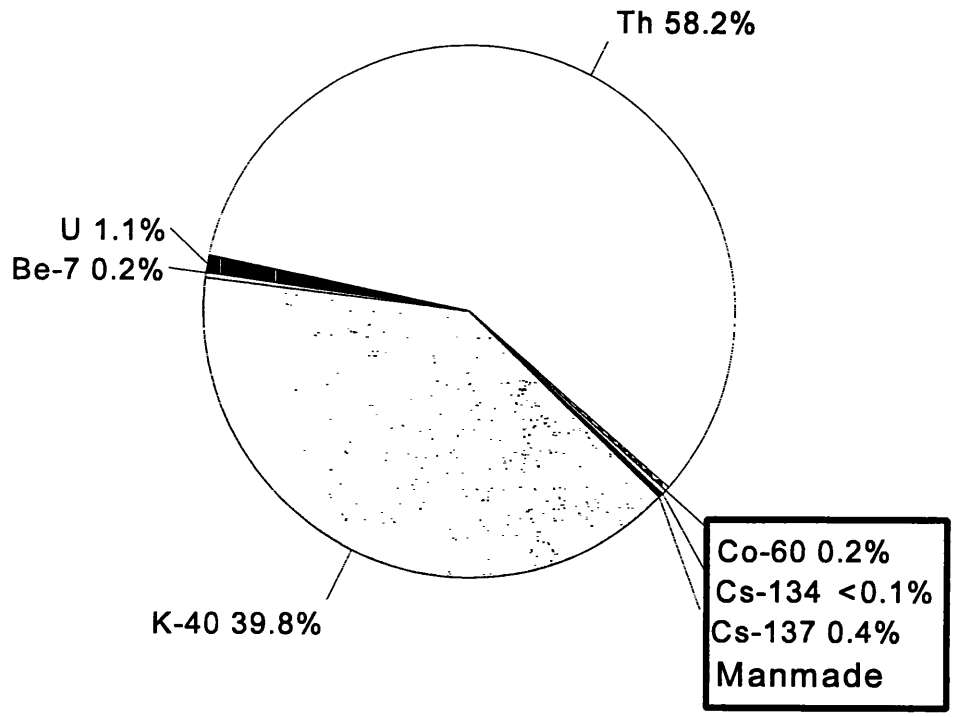

Figure 3-14. Proportion of natural vs. manmade (plant plus weapons) and principal natural radionuclides in sediment samples. Specific data from the Calvert Cliffs Outfall Transect, Station Number 3.

Thorium and Uranium. Nuclear decay of natural thorium (^{232}Th) and natural uranium (^{238}U) produces gamma-emitting daughter elements (e.g., thorium: ^{228}Ac, ^{208}Tl, ^{212}Pb; uranium: ^{226}Ra, ^{214}Bi, ^{214}Pb) that account for most radioactivity in bay sediments. Mean thorium concentrations generally ranged from 1000 to 20,000 pCi/kg with highest concentrations observed at offshore stations having fine-grained sediment. Uranium concentrations, which were also higher at offshore stations, generally ranged from 60 to 300 pCi/kg.

Potassium-40 was detected in all bay sediments during the monitoring period. Mean ^{40}K concentrations were an order of magnitude greater at offshore sampling stations which consisted predominantly of fine-grained sediments.

Beryllium-7 is a natural radionuclide produced by the interaction of cosmic rays with atmospheric oxygen and nitrogen. It is deposited on water and soil surfaces through precipitation scavenging and may enter the water through runoff from land. It adsorbs rapidly to particles suspended in the water column and appears in sediments as a result of particulate deposition. Beryllium-7 was detected in varying concentrations in sediments in nearly all transects during the monitoring period. Concentrations of ^{7}Be were generally highest in clay sediments collected from stations at moderate depth (ca. 7 to 13 m). Concentrations of ^{7}Be at the LNG terminal were inordinately high (approx. 400 pCi/kg dry at stations 2 and 3) compared to concentrations in clay sediments at other stations (approx. 150 pCi/kg dry).

3.2.1.3 Radionuclides from Weapons Tests

The variety, concentrations, and frequency of detection of radionuclides from weapons tests in sediments collected near CCNPP has decreased continually since 1981. Other than ^{137}Cs, no fallout radionuclides were detected in sediments during the monitoring period.

Cesium-137 has been distributed worldwide. It was detected in 90% of bay sediments collected quarterly during the monitoring period. The concentration of ^{137}Cs in sediment samples appears to gradually decrease as one moves north to south in the study area. Average detected concentrations were an order of magnitude greater in clay sediments than in sand sediments; however, activities in clay samples taken from deep depths were less than those taken from moderate depths. The average activities observed in the current monitoring period were slightly less than quantities observed in earlier monitoring periods, and at some stations activities dropped below detectability.

3.2.2 Biota

PPRP's monitoring results for biota collected between 1991 and 1994 are summarized below. Where relevant, radionuclide concentrations detected in biota are compared with levels observed during previous reporting periods.

Detectable concentrations of plant-related radionuclides (^{110m}Ag, ^{58}Co and ^{60}Co) were found in biological samples (oysters). The principal CCNPP-related radionuclide encountered in biological tissue was ^{110m}Ag (80% of non-control oyster samples). Oysters from natural bars and trays have contained ^{110m}Ag consistently, and small concentrations of ^{58}Co and other CCNPP-related radionuclides sporadically, since 1978 (McLean et al. 1982; Domotor and McLean 1988, Stanek and McLean 1995a). Figure 3-15 depicts the frequency of detection of CCNPP-related radionuclides in samples of biota. Appendix C presents all data for radionuclide concentrations detected in biota collected between 1991 and 1994.

Natural Bar Oysters. Silver-110m concentrations during the monitoring period were higher in 1991 than in 1992, coincident with relative release levels during that period. Small concentrations of ^{58}Co were detected frequently. ^{60}Co was detected in natural bar oysters once in August 1992. A very small concentration of ^{137}Cs attributable to weapons test fallout was detected once in August 1991.

Figure 3-16 depicts the historical trend of ^{110m}Ag concentrations measured in natural bar oysters since 1978. The major peaks observed in 1982 and 1986 followed relatively large releases of ^{110m}Ag from CCNPP. A significant decline in CCNPP-related releases of ^{110m}Ag since 1985 is considered the major factor in the decline of ^{110m}Ag concentrations in natural bar oysters.

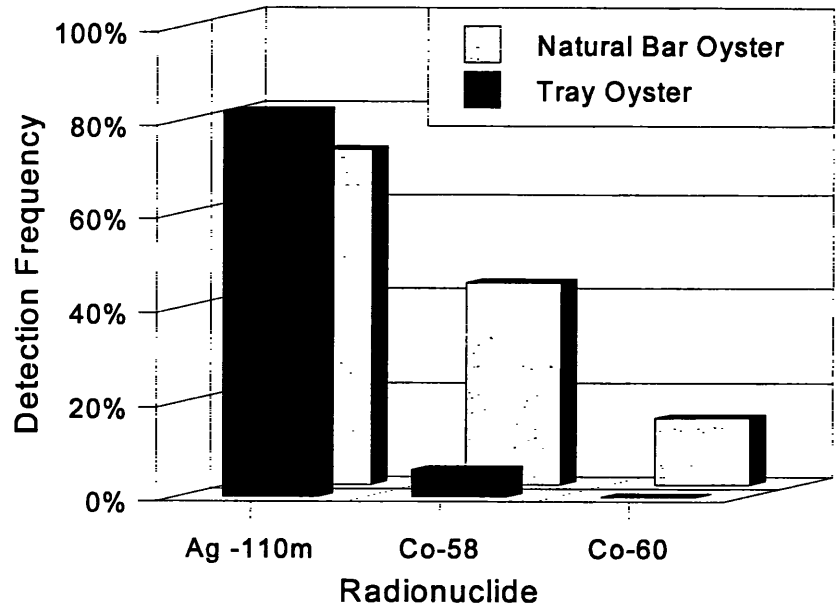

Figure 3-15. Radionuclides detected in biota samples collected from Chesapeake Bay, 1991-1994.

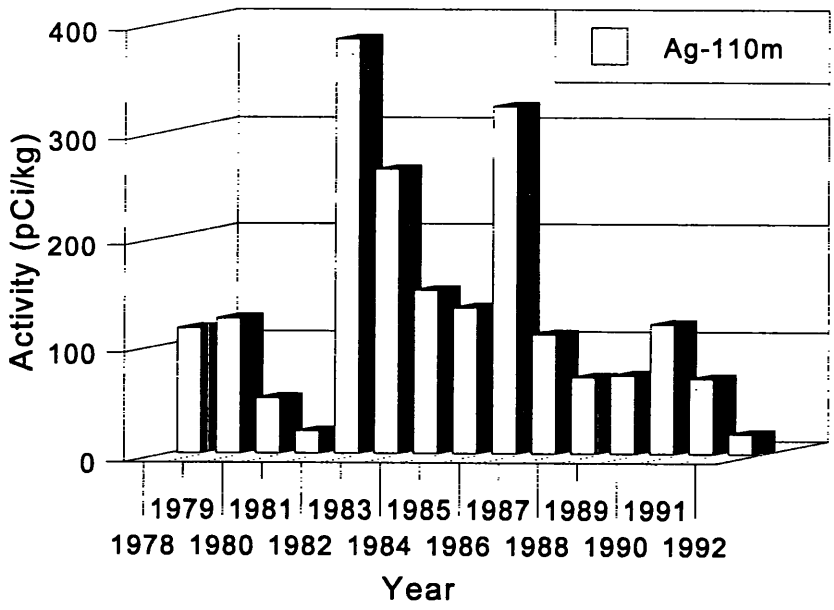

Figure 3-16. Silver-110m concentrations in natural bar oysters, 1978-1992.

Tray Oysters. Silver-110m was the most frequently detected CCNPP-related radionuclide in tray oysters. Concentrations of ^{110m}Ag in oysters reached maxima (ca. 100 pCi/kg wet weight) in 1991 and 1993, following periods of relatively high release rates for ^{110m}Ag in these same periods. A relative trough in radiosilver release in 1992 and 1994 produced activities in oyster flesh at or near minimum-detectable levels (Figure 3-17). A small concentration of ^{58}Co was detected in two samples in December 1991. Silver-110m was not detected in continually exposed oysters at the farfield (control) location (Kenwood Beach) during the monitoring period.

A statistical model has been developed to predict radionuclide concentrations in tray oysters exposed during different seasons and under different environmental conditions. The model also identifies the relative importance of physical, chemical, and environmental parameters (e.g., plant releases, water temperature, season of exposure) in regulating the uptake of radionuclides (particularly ^{110m}Ag) by tray oysters. A detailed discussion of the tray oyster study and statistical modelling of radionuclide concentrations in tray oysters can be found elsewhere (McLean et al. 1987; Rose et al. 1988, 1989).

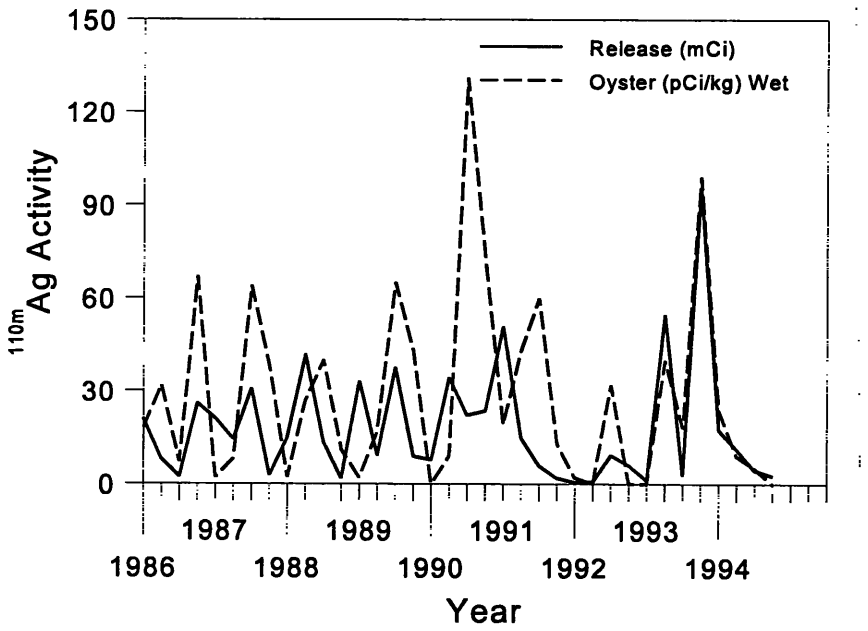

Figure 3-17. Concentration of ^{110m}Ag in CCNPP aqueous effluent and tray oysters, 1979-1994.

3.3 RADIOLOGICAL EFFECTS ON THE ENVIRONMENT AND HUMAN HEALTH

3.3.1 Effect on the Environment

Although small concentrations of radionuclides attributable to discharges from CCNPP were detected in most of the biota collected between 1991 and 1994, the maximum detected concentrations were orders of magnitude lower than concentrations of natural radionuclides. Radiation doses to aquatic organisms attributable to CCNPP-related discharges are an insignificant proportion of doses derived from natural radioactivity (Whicker and Schultz 1982). Living organisms normally receive most of their external dose from naturally occurring radionuclides and their internal exposure from naturally occurring radionuclides such as ^{40}K. Adverse effects on sensitive aquatic vertebrates have been detected at dose rates as low as 0.4 mGy/h (40 mrad/h or approximately 350 rem in one year). Adverse effects on molluscs appear at doses of 87,660 rem in one year (Eisler 1994).

3.3.2 Effect on Human Health

As part of the monitoring program, radiation doses to potential human consumers of oysters were estimated. "Dose commitment" as used in this report refers to the total dose to a tissue or organ during a period of 50 years following ingestion, after allowing for the metabolic processes of excretion and radioactive decay. The dose commitment calculations are based on three variables. The first variable is the maximum, or worst-case, estimated concentration of plant-related radionuclides in oysters collected from the vicinity of CCNPP. The second variable is an estimate of the maximum quantity of oysters consumed by an individual according to age (i.e., child = 1.7 kg/yr; teen = 3.8 kg/yr; adult = 5 kg/yr; USNRC 1977). The third variable is the dose from the intake of a radionuclide (USNRC 1977).

Table 3-4 presents estimated dose commitments to adults, teenagers, and children. The estimated maximum dose from consumption of oysters was 0.04 mrem/year to an adult's gastrointestinal tract during 1991 through 1994. The estimated maximum total body dose was 0.0002 mrem/year. These estimated doses are well below design limits stipulated in 10 CFR Part 50 Appendix I, which restricts total body doses to a maximally exposed individual to 3 mrem/yr for the aqueous pathway (USNRC 1977).

Table 3-4. Estimated maximum dose commitments* to an individual consuming oysters affected by releases from CCNPP, 1991-1994. Recommended consumption values and conversion factors derived from USNRC 1977.

Age Group	1991-1994		
	Adult	Teen	Child
Total Body			
^{58}Co	0.0001	0.0001	0.0001
^{60}Co	0.0001	0.0001	0.0001
^{65}Zn	0.0000	0.0000	0.0000
^{110m}Ag	0.0000	0.0000	0.0001
TOTAL	0.0002	0.0002	0.0002
Bone			
^{58}Co	-	-	-
^{60}Co	-	-	-
^{65}Zn	0.0000	0.0000	0.0000
^{110m}Ag	0.0001	0.0001	0.0001
TOTAL	0.0001	0.0001	0.0001
Liver			
^{58}Co	0.0000	0.0000	0.0000
^{60}Co	0.0000	0.0000	0.0000
^{65}Zn	0.0000	0.0000	0.0000
^{110m}Ag	0.0001	0.0001	0.0001
TOTAL	0.0002	0.0002	0.0001
Kidney			
^{58}Co	-	-	-
^{60}Co	-	-	-
^{65}Zn	0.0000	0.0000	0.0000
^{110m}Ag	0.0002	0.0002	0.0001
TOTAL	0.0002	0.0002	0.0001
Gastrointestinal Tract - lower large intestine			
^{58}Co	0.0009	0.0006	0.0002
^{60}Co	0.0006	0.0004	0.0001
^{65}Zn	0.0000	0.0000	0.0000
^{110m}Ag	0.0335	0.0230	0.0082
TOTAL	0.0350	0.0240	0.0085

* Dose commitment: $\frac{kg}{yr} \times \frac{mrem}{pCi} \times \frac{pCi}{kg}$

4.0 CONCLUSIONS

During the 1991-1994 monitoring period, CCNPP released radionuclides to the environment as a normal consequence of routine operations and all quantities released were less than regulatory limits set by the USNRC. Radionuclides released from the plant were detected in sediments and biota collected from the Chesapeake Bay; however, concentrations and the frequency of detection in environmental samples were generally lower than that reported for previous monitoring periods.

Radionuclides from CCNPP, nuclear weapons testing, and natural sources contributed to the total radioactivity measured in environmental samples. Radionuclides from natural sources (primarily radionuclides from the uranium and thorium decay series, ^{40}K, and ^{7}Be) contributed most to the total radioactivity of environmental samples.

The measured concentrations of radionuclides in sediments and biota do not represent a risk to the ecological health of the Chesapeake Bay system. The additional increment of radioactivity and radiation dose attributable to the operation of CCNPP is minimal when compared with natural levels of radioactivity and the associated natural radioactive dose. The concentrations of radionuclides in sediments and biota would increase the radiological dose to man by no more than 0.1%. This is an insignificant increase in radiation dose when compared with the dose to human populations attributable to natural background sources which vary according to geographic region and elevation, habitat type (i.e., construction material used in residences), life-style choices (i.e., smoking, occupation), and routine medical procedures.

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APPENDIX A

COORDINATES OF SAMPLING LOCATIONS

Transects and Stations for Sediments Collected from Chesapeake Bay		
Station	**North Latitude**	**West Longitude**
Western Shore		
WS-1	38° 29.321	76° 29.336
WS-2	38° 29.460	76° 29.239
WS-3	38° 29.752	76° 28.272
WS-4	38° 30.975	76° 25.897
Flag Pond		
FP-1	38° 27.254	76° 26.873
FP-2	38° 27.302	76° 26.820
FP-3	38° 27.402	76° 26.476
FP-4	38° 29.211	76° 24.790
Calvert Cliffs Outfall		
CCO-1	38° 26.316	76° 26.412
CCO-2	38° 26.455	76° 26.266
CCO-3	38° 26.795	76° 25.753
CCO-4	38° 28.245	76° 24.055
Rocky Point		
RP-1	38° 25.074	76° 24.949
RP-2	38° 28.356	76° 24.490
RP-3	38° 25.327	76° 24.300
RP-4	38° 26.068	76° 22.896
Liquid Natural Gas Line		
LNG-1	38° 22.625	76° 23.083
LNG-2	38° 23.652	76° 22.882
LNG-3	38° 23.745	76° 22.495
LNG-4	38° 23.997	76° 21.431
Cove Point		
CP-1	38° 22.500	76° 22.859
CP-2	38° 22.541	76° 22.446
CP-3	38° 22.601	76° 21.934
CP-4	38° 22.635	76° 20.725
Little Cove Point		
LCP-1	38° 21.292	76° 21.490
LCP-2	38° 21.368	76° 20.180
Drum Point		
DP-1	38° 19.553	76° 22.354
DP-2	38° 19.574	76° 19.757

APPENDIX B

INTERCOMPARISON RESULTS

Table B-1. Results of EPA Cross Check Program

Sample Date	Sample Type and Units	Radionuclide	Laboratory's Results (avg)	EPA's Results
02/08/91	Water-pCi/L	Co-60	37.00	40 ± 5
		Zn-65	147.67	149 ± 15
		Ru-106	179.30	286 ± 19
		Cs-134	8.00	8 ± 5
		Cs-137	7.67	8 ± 5
		Ba-133	71.00	75 ± 8
06/07/91	Water-pCi/L	Co-60	10.00	10 ± 5
		Zn-65	108.00	108 ± 11
		Ru-106	141.33	149 ± 15
		Cs-134	13.00	15 ± 5
		Cs-137	15.67	14 ± 5
		Ba-133	64.00	62 ± 6
02/14/92	Water-pCi/L	Co-60	40.33	40 ± 5
		Zn-65	146.00	148 ± 15
		Ru-106	180.00	203 ± 20
		Cs-134	30.00	31 ± 5
		Cs-137	49.67	49 ± 5
		Ba-133	74.67	76 ± 8
06/05/92	Water-pCi/L	Co-60	21.00	20 ± 5
		Zn-65	104.00	99 ± 10
		Ru-106	144.33	141 ± 14
		Cs-134	14.00	15 ± 5
		Cs-137	15.33	15 ± 5
		Ba-133	98.33	98 ± 10
06/11/93	Water-pCi/L	Co-60	13.67	15 ± 5
		Zn-65	107.33	103 ± 10
		Ru-106	90.67	119 ± 12
		Cs-134	4.67	5 ± 5
		Cs-137	6.33	5 ± 5
		Ba-133	100.00	99 ± 10
11/12/93	Water-pCi/L	Co-60	(1)	30 ± 5
		Zn-65	(1)	150 ± 15
		Ru-106	(1)	201 ± 20
		Cs-134	(1)	59 ± 5
		Cs-137	(1)	40 ± 5
		Ba-133	(1)	79 ± 8

Table B-1. Continued

Sample Date	Sample Type and Units	Radionuclide	Laboratory's Results (avg)	EPA's Results
06/10/94	Water-pCi/L	Co-60	(2)	50 ± 5
		Zn-65	(2)	134 ± 13
		Ru-106	(2)	252 ± 25
		Cs-134	(2)	40 ± 5
		Cs-137	(2)	49 ± 5
		Ba-133	(2)	98 ± 10
11/04/94	Water-pCi/L	Co-60	53.67	59 ± 5
		Zn-65	105.00	100 ± 10
		Ru-106	(3)	(3) (3)
		Cs-134	20.33	20.33 ± 5
		Cs-137	47.33	47.33 ± 5
		Ba-133	65.33	65.33 ± 7

Note:

(1) No data available. Analysis not performed by laboratory.

(2) The values reported to the EPA were incorrect. The detector efficiency pairs were off by a factor of two. The corrected results of 54, 156, 194, 39, 55, and 93 pCi/L are within the control limits and below the warning regions.

(3) The EPA notified participants that ^{106}Ru has been eliminated from the Performance Evaluation Studies until further notice.

APPENDIX C

CONCENTRATIONS OF RADIONUCLIDES IN ENVIRONMENTAL SAMPLES

INTRODUCTION

This appendix contains data for most of the radionuclides detected in the environmental samples collected in the vicinity of the CCNPP during the 1991 through 1994 monitoring period. The radionuclides reported in these tables include the naturally occurring radionuclides ^{7}Be and ^{40}K, and the power plant produced radionuclides ^{110m}Ag, ^{58}Co, ^{60}Co, ^{134}Cs, ^{137}Cs, ^{95}Nb, ^{65}Zn, and ^{95}Zr. Radionuclide concentrations in sediments are reported as pCi/kg dry weight. Radionuclide concentrations in biological samples are reported as pCi/kg wet weight. Data are organized in the following tables:

Within each table, specific sample stations are arranged approximately north to south and data are presented by quarter along with annual and overall means for the entire four-year monitoring period. Data are decay corrected to the date of sample collection. Counting error is reported as ± 2-sigma error. Concentrations for radionuclides that were not detected in specific samples are recorded as less than (LT) the lower limit of detection for that sample as determined by spectrum analysis programs. Annual means were calculated as a simple arithmetic average of quarterly concentrations and variability was expressed as 2 standard deviation units. Overall means were calculated as the arithmetic average of annual means and variability was expressed as 2 standard deviation units. Lower limits of detection were excluded from mean calculations.

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCWES010 - Calvert Cliffs Western Shore Station 1										
02/13/91	LT	49	638	+- 46	LT	6	LT	5	LT	5
05/01/91	LT	42	1123	+- 81	LT	6	LT	4	LT	4
08/14/91	LT	54	770	+- 49	LT	6	LT	5	LT	4
11/25/91	LT	56	1035	+- 62	LT	6	LT	5	LT	4
Yearly	--		892	+- 452	--		--		--	
02/19/92	LT	57	967	+- 60	LT	5	LT	5	LT	4
05/05/92	LT	108	1203	+- 75	LT	9	LT	9	LT	6
08/18/92	LT	85	1184	+- 73	LT	9	LT	8	LT	6
11/10/92	LT	50	863	+- 62	LT	5	LT	4	LT	5
Yearly	--		1054	+- 333	--		--		--	
02/23/93	LT	50	774	+- 59	LT	4	LT	3	LT	4
05/06/93	LT	71	763	+- 43	LT	3	LT	5	LT	2
08/18/93	LT	78	1160	+- 53	LT	4	LT	6	LT	3
11/22/93	LT	48	945	+- 45	LT	3	LT	4	LT	2
Yearly	--		911	+- 372	--		--		--	
03/21/94	35	+- 35	896	+- 43	LT	3	LT	3	LT	3
06/20/94	47	+- 25	1188	+- 55	LT	3	LT	3	LT	3
08/23/94	31	+- 18	1090	+- 50	LT	3	LT	2	LT	3
11/28/94	14	+- 18	1326	+- 56	LT	3	LT	2	LT	2
Yearly	32	+- 27	1125	+- 362	--		--		--	
Overall	32	+- 27	995	+- 226	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCWES020 - Calvert Cliffs Western Shore Station 2										
02/13/91	31	+- 52	2279	+- 109	LT 10		LT 7		LT 8	
05/01/91	LT	2440	669	+- 108	LT 32		LT 129		LT 15	
08/14/91	LT	52	715	+- 47	LT 5		LT 5		LT 4	
11/25/91	LT	43	943	+- 58	LT 5		LT 4		LT 5	
Yearly	31	+- 52	1152	+- 1522	--		--		--	
02/19/92	LT	49	1051	+- 59	LT 5		LT 4		LT 4	
05/05/92	LT	98	1473	+- 77	LT 7		LT 7		LT 5	
08/18/92	38	+- 2	721	+- 40	LT 2		LT 2		LT 2	
11/10/92	87	+- 68	5233	+- 115	LT 6		LT 7		LT 5	
Yearly	63	+- 69	2120	+- 4197	--		--		--	
02/23/93	LT	30	1315	+- 47	LT 3		LT 3		LT 2	
05/06/93	LT	54	576	+- 33	LT 3		LT 4		LT 2	
08/18/93	77	+- 71	941	+- 49	LT 4		LT 5		LT 2	
11/22/93	101	+- 79	5056	+- 121	LT 6		LT 7		LT 5	
Yearly	89	+- 34	1972	+- 4156	--		--		--	
03/21/94	64	+- 42	3308	+- 93	LT 4		LT 5		LT 5	
06/20/94	83	+- 32	1572	+- 53	LT 3		LT 2		LT 2	
08/23/94	99	+- 20	1100	+- 37	LT 2		LT 1		LT 2	
11/28/94	31	+- 14	825	+- 30	LT 2		LT 1		LT 1	
Yearly	69	+- 58	1701	+- 2229	--		--		--	
Overall	63	+- 48	1736	+- 853	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCWES030 - Calvert Cliffs Western Shore Station 3										
02/13/91	LT	228	13517	487	LT	31	LT	25	LT	32
05/01/91	LT	247	14973	419	LT	24	LT	21	LT	22
08/14/91	LT	270	10583	444	LT	31	LT	29	22	22
11/25/91	LT	199	13880	555	LT	33	LT	24	40	39
Yearly	--		13238	3750	--		--		31	25
02/19/92	LT	203	15345	460	LT	25	LT	20	LT	26
05/05/92	LT	212	17240	379	LT	17	LT	18	36	21
08/18/92	LT	86	16643	333	LT	12	LT	9	LT	14
11/10/92	LT	123	14850	327	LT	13	LT	12	21	16
Yearly	--		16020	2221	--		--		29	21
02/23/93	LT	111	17485	385	LT	14	LT	11	23	20
05/06/93	LT	244	16338	359	LT	15	LT	20	13	14
08/18/93	LT	378	20466	450	LT	21	LT	31	LT	19
11/22/93	LT	207	15735	346	LT	14	LT	18	18	14
Yearly	--		17506	4205	--		--		18	10
03/21/94	LT	154	17119	377	LT	15	LT	17	19	13
06/20/94	LT	101	18835	301	LT	12	LT	10	11	10
08/23/94	50	58	14002	280	LT	11	LT	8	18	12
11/28/94	LT	75	15230	305	LT	11	LT	8	13	11
Yearly	50	58	16297	4246	--		--		15	8
Overall	50	58	15765	3608	--		--		23	15

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCWES040 - Calvert Cliffs Western Shore Station 4										
02/13/91	LT	276	15695	+- 534	LT	33	LT	30	LT	30
05/01/91	LT	156	11041	+- 287	LT	16	LT	15	LT	14
08/14/91	LT	270	13381	+- 455	LT	28	LT	28	LT	25
11/25/91	LT	176	12751	+- 510	LT	29	LT	21	LT	30
Yearly	--		13217	+- 3850	--		--		--	
02/19/92	LT	57	13774	+- 248	LT	8	LT	6	LT	9
05/05/92	129	+- 116	16043	+- 353	LT	13	LT	11	12	+- 11
08/18/92	126	+- 113	17463	+- 384	LT	15	LT	13	LT	15
11/10/92	LT	1444	24873	+- 1443	LT	93	LT	125	LT	76
Yearly	128	+- 4	18038	+- 9606	--		--		12	+- 11
02/23/93	LT	151	15905	+- 350	LT	14	LT	14	LT	14
05/06/93	LT	304	16138	+- 387	LT	19	LT	27	LT	16
08/18/93	LT	330	21506	+- 387	LT	18	LT	27	LT	15
11/22/93	LT	174	16092	+- 290	LT	13	LT	16	LT	11
Yearly	--		17410	+- 5465	--		--		--	
03/21/94	LT	135	16834	+- 337	LT	13	LT	15	LT	13
06/20/94	LT	97	17982	+- 324	LT	12	LT	10	LT	13
08/23/94	69	+- 62	21645	+- 303	LT	12	LT	8	LT	11
11/28/94	LT	72	18270	+- 292	LT	10	LT	8	7	+- 9
Yearly	69	+- 62	18683	+- 4140	--		--		7	+- 9
Overall	98	+- 83	16837	+- 4937	--		--		10	+- 7

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCFLP010 - Calvert Cliffs Flag Pond Station 1										
02/13/91	LT 44		323	+- 28	LT 6		LT 5		LT 5	
05/01/91	LT 38		454	+- 36	LT 5		LT 4		LT 4	
08/14/91	LT 62		654	+- 47	LT 6		LT 6		LT 5	
11/25/91	LT 43		681	+- 49	LT 4		LT 4		LT 3	
Yearly	--		528	+- 340	--		--		--	
02/19/92	LT 15		363	+- 25	LT 2		LT 2		LT 1	
05/05/92	LT 79		548	+- 48	LT 7		LT 7		LT 5	
08/18/92	74	+- 47	851	+- 66	LT 5		6	+- 4	LT 4	
11/10/92	LT 50		550	+- 48	LT 4		LT 4		LT 4	
Yearly	74	+- 47	578	+- 404	--		6	+- 4	--	
02/23/93	28	+- 28	779	+- 36	LT 3		LT 3		LT 2	
05/06/93	LT 82		1265	+- 56	LT 4		LT 6		LT 3	
08/18/93	LT 89		810	+- 45	LT 4		LT 6		LT 3	
11/22/93	LT 47		653	+- 37	LT 3		LT 4		LT 3	
Yearly	28	+- 28	877	+- 535	--		--		--	
03/21/94	LT 32		732	+- 38	LT 3		LT 3		LT 3	
06/20/94	51	+- 23	1006	+- 40	LT 2		LT 2		LT 2	
08/23/94	32	+- 16	805	+- 42	LT 3		LT 2		LT 2	
11/28/94	LT 19		728	+- 39	LT 3		LT 2		LT 2	
Yearly	42	+- 27	818	+- 261	--		--		--	
Overall	48	+- 47	700	+- 346	--		6	+- 4	--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCFLP020 - Calvert Cliffs Flag Pond Station 2										
02/13/91	LT	110	5884	153	LT	12	LT	10	28	9
05/01/91	LT	71	5648	158	LT	9	LT	7	LT	8
08/14/91	LT	190	4334	173	LT	13	LT	16	19	11
11/25/91	LT	90	5431	152	LT	10	LT	8	26	11
Yearly	--		5324	1371	--		--		24	9
02/19/92	252	196	5457	120	LT	7	LT	12	17	6
05/05/92	142	58	6042	133	LT	6	LT	6	11	6
08/18/92	LT	82	7241	188	LT	11	LT	9	LT	10
11/10/92	LT	70	5356	107	LT	6	LT	6	14	7
Yearly	197	156	6024	1732	--		--		14	6
02/23/93	90	67	5492	121	LT	6	LT	7	15	8
05/06/93	120	100	5151	113	LT	6	8	7	15	6
08/18/93	LT	204	7491	165	LT	10	LT	16	17	9
11/22/93										
Yearly	105	42	6045	2528	--		8	7	16	2
03/21/94	187	58	5335	117	LT	6	LT	6	8	5
06/20/94	120	58	3981	88	LT	9	LT	7	14	7
08/23/94	222	39	6704	107	LT	5	5	3	10	5
11/28/94	303	60	7478	120	LT	5	LT	4	6	5
Yearly	208	152	5875	3085	--		5	3	10	7
Overall	170	113	5817	674	--		7	4	16	12

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCFLP030 - Calvert Cliffs Flag Pond Station 3										
02/13/91	LT	180	15148	424	LT	23	LT	18	LT	24
05/01/91	LT	208	10316	392	LT	24	LT	22	LT	25
08/14/91	LT	404	13489	405	LT	26	LT	32	36	20
11/25/91	LT	176	10630	425	LT	27	LT	21	36	25
Yearly	--		12396	4649	--		--		36	0
02/19/92	LT	128	12988	286	LT	12	LT	12	26	13
05/05/92	251	165	14176	340	LT	14	LT	15	44	18
08/18/92	LT	669	17716	850	LT	49	LT	62	LT	43
11/10/92	LT	111	12917	258	LT	11	LT	10	34	16
Yearly	251	165	14449	4506	--		--		35	18
02/23/93	LT	171	12076	266	LT	12	LT	14	25	12
05/06/93	LT	274	15038	331	LT	15	LT	22	25	13
08/18/93	LT	358	16330	327	LT	17	LT	27	20	19
11/22/93										
Yearly	--		14481	4362	--		--		23	6
03/21/94	LT	144	15072	330	LT	13	LT	15	17	11
06/20/94	96	79	17482	280	LT	11	LT	10	16	10
08/23/94	63	49	16642	333	LT	9	LT	6	12	10
11/28/94	LT	94	19207	346	LT	13	LT	10	22	15
Yearly	80	47	17101	3446	--		--		17	8
Overall	165	243	14607	3856	--		--		28	18

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCFLP040 - Calvert Cliffs Flag Pond Station 4									
02/13/91	LT	193	15563	+- 436	LT	24	LT	19	LT	23
05/01/91	LT	196	9095	+- 382	LT	24	LT	23	LT	22
08/14/91	LT	462	15763	+- 473	LT	33	LT	39	LT	27
11/25/91	LT	161	10030	+- 421	LT	25	LT	19	LT	25
Yearly	--		12613	+- 7087	--		--		--	
02/19/92	LT	352	17208	+- 516	LT	32	LT	32	LT	28
05/05/92	LT	544	16851	+- 539	LT	37	LT	42	LT	30
08/18/92	LT	325	16091	+- 483	LT	32	LT	31	LT	29
11/10/92	LT	161	13458	+- 323	LT	12	LT	15	LT	13
Yearly	--		15902	+- 3389	--		--		--	
02/23/93	LT	201	13539	+- 325	LT	14	LT	18	LT	14
05/06/93	LT	308	16785	+- 403	LT	20	LT	27	16	+- 18
08/18/93	LT	378	19245	+- 423	LT	20	LT	31	LT	17
11/22/93										
Yearly	--		16523	+- 5724	--		--		16	+- 18
03/21/94	LT	162	17077	+- 376	LT	15	LT	19	LT	15
06/20/94	LT	113	17856	+- 357	LT	14	LT	12	24	+- 13
08/23/94	LT	91	23199	+- 371	LT	13	LT	9	12	+- 13
11/28/94	72	+- 82	20650	+- 330	LT	13	LT	10	7	+- 8
Yearly	72	+- 82	19696	+- 5589	--		--		14	+- 17
Overall	72	+- 82	16183	+- 5806	--		--		15	+- 2

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCCO010 - Calvert Cliffs Outfall Station 1										
02/13/91	LT	48	788	+- 57	LT	5	LT	4	LT	4
05/01/91	LT	49	1211	+- 65	LT	5	LT	4	LT	4
08/14/91	LT	44	1217	+- 51	LT	3	LT	4	LT	2
11/25/91	27	+- 20	1352	+- 59	LT	3	LT	3	LT	3
Yearly	27	+- 20	1142	+- 490	--		--		--	
02/19/92	LT	176	2062	+- 87	LT	8	LT	12	LT	5
05/05/92	LT	112	1223	+- 71	LT	8	LT	9	LT	5
08/18/92	LT	835	4393	+- 466	LT	54	LT	72	LT	33
11/10/92	LT	109	1406	+- 76	LT	8	LT	9	LT	5
Yearly	--		2271	+- 2920	--		--		--	
02/23/93	LT	58	1073	+- 49	LT	4	LT	5	LT	2
05/06/93	LT	85	504	+- 23	LT	4	LT	7	LT	3
08/18/93	LT	112	1381	+- 58	LT	5	LT	8	LT	3
11/22/93	LT	60	1049	+- 48	LT	4	LT	5	LT	3
Yearly	--		1002	+- 729	--		--		--	
03/21/94	56	+- 37	1260	+- 53	LT	3	LT	4	LT	3
06/20/94	16	+- 18	1245	+- 40	LT	2	LT	2	1	+- 2
08/23/94	41	+- 22	1215	+- 53	LT	3	LT	2	LT	3
11/28/94	16	+- 19	874	+- 42	LT	3	LT	2	LT	2
Yearly	32	+- 39	1149	+- 368	--		--		1	+- 2
Overall	30	+- 7	1391	+- 1181	--		--		1	+- 2

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCCCO020 - Calvert Cliffs Outfall Station 2									
02/13/91	LT	64	1075	67	LT 8		LT 6		LT 7	
05/01/91	44	43	953	53	LT 6		LT 5		LT 5	
08/14/91	65	31	1079	45	LT 3		LT 3		2	2
11/25/91	41	27	729	36	LT 3		4	2	3	2
Yearly	50	26	959	328	--		4	2	3	1
02/19/92	LT	154	2877	104	LT 9		LT 12		LT 7	
05/05/92	LT	236	1062	69	LT 23		LT 24		LT 19	
08/18/92	319	108	4940	128	LT 9		33	10	20	8
11/10/92	LT	50	1400	67	LT 5		LT 4		LT 5	
Yearly	319	108	2570	3532	--		33	10	20	8
02/23/93	LT	140	3858	77	LT 5		LT 10		4	3
05/06/93	LT	62	1006	42	LT 3		5	4	4	4
08/18/93	LT	103	1162	49	LT 4		LT 7		2	3
11/22/93	47	52	1101	42	LT 3		LT 4		LT 2	
Yearly	47	52	1782	2771	--		5	4	3	2
03/21/94	59	48	1336	53	LT 3		LT 4		6	3
06/20/94	62	29	1362	57	LT 3		4	3	3	3
08/23/94	101	32	1827	51	LT 3		2	2	2	2
11/28/94	57	26	4910	79	LT 4		LT 3		3	3
Yearly	70	42	2359	3431	--		3	3	4	3
Overall	121	264	1917	1441	--		11	29	7	17

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCCO030 - Calvert Cliffs Outfall Station 3										
02/13/91	LT	87	14780	296	LT	12	LT	9	LT	13
05/01/91	LT	135	16168	323	LT	13	LT	12	11	10
08/14/91	83	96	14900	328	LT	13	LT	11	33	13
11/25/91	LT	70	14107	282	LT	11	LT	8	21	12
Yearly	83	96	14989	1720	--		--		22	22
02/19/92	73	108	13549	325	LT	14	LT	13	33	14
05/05/92	LT	189	15927	350	LT	15	LT	17	32	18
08/18/92	57	70	15069	362	LT	13	LT	10	24	13
11/10/92	100	112	14214	313	LT	12	LT	12	20	13
Yearly	77	43	14690	2066	--		--		27	13
02/23/93	LT	179	14547	320	LT	14	LT	16	26	15
05/06/93	LT	312	16472	329	LT	16	LT	24	13	14
08/18/93	LT	385	15530	342	LT	16	LT	29	23	15
11/22/93	LT	197	13323	266	LT	13	LT	16	17	11
Yearly	--		14968	2698	--		--		20	12
03/21/94	175	153	15673	345	LT	13	LT	16	24	17
06/20/94	145	113	19488	312	LT	7	LT	6	34	18
08/23/94	LT	89	16430	329	LT	13	LT	10	LT	16
11/28/94	LT	100	18088	362	LT	13	LT	10	42	16
Yearly	160	42	17420	3417	--		--		33	18
Overall	107	93	15517	2552	--		--		26	12

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCO040 - Calvert Cliffs Outfall Station 4										
05/01/91	LT	62	12163	+- 243	LT	8	LT	6	LT	9
08/14/91	LT	98	12696	+- 279	LT	11	LT	10	LT	11
11/25/91	LT	185	16509	+- 429	LT	23	LT	19	LT	22
Yearly	--		13789	+- 4741	--		--		--	
02/19/92	LT	371	16872	+- 472	LT	30	LT	32	LT	25
05/05/92	LT	182	15942	+- 351	LT	15	LT	16	LT	14
08/18/92	LT	283	16179	+- 421	LT	28	LT	27	LT	26
11/10/92	LT	191	16961	+- 373	LT	16	LT	18	10	+- 10
Yearly	--		16489	+- 1010	--		--		10	+- 10
02/23/93	LT	203	13954	+- 279	LT	13	LT	17	LT	12
05/06/93	LT	375	18704	+- 411	LT	18	LT	30	14	+- 12
08/18/93	LT	461	18610	+- 409	LT	21	LT	33	20	+- 15
11/22/93	LT	242	17933	+- 359	LT	43	LT	20	LT	13
Yearly	--		17300	+- 4514	--		--		17	+- 8
03/21/94	LT	187	19192	+- 384	LT	15	LT	20	LT	15
06/20/94	LT	123	18145	+- 363	LT	14	LT	12	LT	15
08/23/94	44	+- 62	16868	+- 270	LT	11	LT	8	20	+- 14
11/28/94	LT	86	20339	+- 325	LT	12	LT	9	LT	12
Yearly	44	+- 62	18636	+- 2961	--		--		20	+- 14
Overall	44	+- 62	16554	+- 4089	--		--		16	+- 10

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCROP010 - Calvert Cliffs Rocky Point Station 1										
02/13/91	LT 5400		442	+- 35	LT 18		LT 169		LT 5	
05/01/91	LT 56		654	+- 43	LT 7		LT 5		LT 5	
08/14/91	29	+- 26	981	+- 41	LT 2		LT 3		LT 2	
11/25/91	13	+- 15	824	+- 35	LT 2		LT 2		LT 2	
Yearly	21	+- 23	725	+- 463	--		--		--	
02/19/92	LT 22		648	+- 32	LT 2		LT 2		LT 2	
05/05/92	LT 111		936	+- 67	LT 8		LT 8		LT 5	
08/18/92	LT 66		964	+- 64	LT 7		LT 6		LT 5	
11/10/92	LT 104		657	+- 54	LT 8		LT 9		LT 5	
Yearly	--		801	+- 344	--		--		--	
02/23/93	LT 29		519	+- 32	LT 3		LT 3		LT 2	
05/06/93	LT 100		944	+- 49	LT 4		LT 7		LT 3	
08/18/93	LT 99		662	+- 42	LT 4		LT 7		LT 2	
11/22/93	LT 59		993	+- 44	LT 3		LT 4		LT 2	
Yearly	--		780	+- 454	--		--		--	
03/21/94	33	+- 29	636	+- 36	LT 3		LT 3		LT 2	
06/20/94	23	+- 23	1488	+- 45	LT 9		LT 8		LT 7	
08/23/94	45	+- 24	934	+- 50	LT 3		LT 3		LT 3	
11/28/94	25	+- 20	1268	+- 48	LT 3		LT 2		LT 2	
Yearly	32	+- 20	1082	+- 749	--		--		--	
Overall	26	+- 15	847	+- 319	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCROP020 - Calvert Cliffs Rocky Point Station 2										
02/13/91	LT	52	408	+- 29	LT	5	LT	4	LT	4
05/01/91	LT	39	624	+- 52	LT	4	LT	4	LT	3
08/14/91	LT	42	4382	+- 105	LT	4	LT	4	9	+- 4
11/25/91	9	+- 14	477	+- 31	LT	2	LT	2	LT	2
Yearly	9	+- 14	1473	+- 3883	--		--		9	+- 4
02/19/92	51	+- 36	935	+- 39	LT	3	LT	3	3	+- 2
05/05/92	LT	75	645	+- 49	LT	6	LT	6	LT	4
08/18/92	LT	65	723	+- 54	LT	6	LT	6	LT	5
11/10/92	LT	50	803	+- 61	LT	5	LT	4	LT	4
Yearly	51	+- 36	777	+- 248	--		--		3	+- 2
02/23/93	LT	77	694	+- 40	LT	3	LT	6	LT	2
05/06/93	LT	123	1314	+- 53	LT	4	LT	9	3	+- 3
08/18/93	LT	84	459	+- 36	LT	4	LT	6	LT	2
11/22/93	LT	48	624	+- 35	LT	2	LT	4	LT	2
Yearly	--		773	+- 748	--		--		3	+- 3
03/21/94	LT	33	594	+- 36	LT	3	LT	3	LT	2
06/20/94	40	+- 25	1647	+- 53	LT	3	LT	3	LT	3
08/23/94	18	+- 15	645	+- 32	LT	2	LT	2	LT	2
11/28/94	11	+- 13	678	+- 26	LT	2	LT	1	LT	1
Yearly	23	+- 30	891	+- 1010	--		--		--	
Overall	28	+- 43	978	+- 668	--		--		5	+- 7

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCROP030 - Calvert Cliffs Rocky Point Station 3										
02/13/91	LT	180	14278	+- 428	LT	25	LT	18	92	+- 31
05/01/91	LT	73	12559	+- 276	LT	11	LT	8	46	+- 15
08/14/91	LT	331	17491	+- 455	LT	28	LT	27	LT	24
11/25/91	LT	182	14505	+- 435	LT	26	LT	18	77	+- 35
Yearly	--		14708	+- 4097	--		--		72	+- 47
02/19/92	151	+- 78	13137	+- 289	LT	12	LT	8	35	+- 14
05/05/92	LT	214	13900	+- 445	LT	26	LT	22	47	+- 30
08/18/92	LT	125	13889	+- 333	LT	13	LT	13	43	+- 20
11/10/92	LT	140	14012	+- 308	LT	13	LT	13	33	+- 15
Yearly	151	+- 78	13735	+- 804	--		--		40	+- 13
02/23/93	LT	104	13339	+- 322	LT	13	LT	6	20	+- 15
05/06/93	LT	328	15662	+- 345	LT	19	LT	26	35	+- 17
08/18/93	LT	548	18210	+- 437	LT	24	LT	40	42	+- 21
11/22/93	451	+- 278	15482	+- 372	LT	17	LT	23	23	+- 18
Yearly	451	+- 278	15673	+- 3987	--		--		30	+- 21
03/21/94	LT	180	17275	+- 380	LT	16	LT	17	37	+- 16
06/20/94	LT	100	16584	+- 265	LT	11	LT	10	36	+- 11
08/23/94	LT	93	14899	+- 358	LT	14	LT	11	30	+- 15
11/28/94	159	+- 122	20869	+- 417	LT	16	LT	13	73	+- 24
Yearly	159	+- 122	17407	+- 5029	--		--		44	+- 39
Overall	254	+- 342	15381	+- 3131	--		--		46	+- 36

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCROP040 - Calvert Cliffs Rocky Point Station 4										
02/13/91	LT	202	14176	+- 369	LT	20	LT	19	LT	18
05/01/91	LT	75	12938	+- 259	LT	9	LT	8	LT	9
08/14/91	LT	101	11718	+- 258	LT	11	LT	10	29	+- 11
11/25/91	LT	181	18549	+- 445	LT	25	LT	18	LT	24
Yearly	--		14345	+- 5953	--		--		29	+- 11
02/19/92	LT	248	15558	+- 405	LT	24	LT	22	LT	21
05/05/92	LT	185	16177	+- 420	LT	23	LT	18	LT	21
08/18/92	LT	121	17173	+- 343	LT	12	LT	12	LT	13
11/10/92	LT	1280	23210	+- 1346	LT	87	LT	121	LT	60
Yearly	--		18030	+- 7034	--		--		--	
02/23/93	LT	187	12932	+- 259	LT	12	LT	15	LT	10
05/06/93	LT	396	16840	+- 340	LT	16	LT	29	LT	14
08/18/93	LT	451	17277	+- 346	LT	17	LT	31	LT	13
11/22/93	LT	199	15692	+- 282	LT	12	LT	16	23	+- 11
Yearly	--		15685	+- 3907	--		--		23	+- 11
03/21/94	LT	171	20960	+- 377	LT	14	LT	16	LT	14
06/20/94	80	+- 105	18082	+- 325	LT	12	LT	10	LT	12
08/23/94	LT	71	20076	+- 281	LT	10	LT	8	LT	10
11/28/94	LT	81	24060	+- 289	LT	11	LT	9	LT	11
Yearly	80	+- 105	20795	+- 4975	--		--		--	
Overall	80	+- 105	17214	+- 5663	--		--		26	+- 8

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLNG010 - Calvert Cliffs LNG Plant Pipeline Station 1										
02/13/91	LT	55	556	42	LT	6	LT	5	LT	5
05/01/91	LT	39	1024	55	LT	5	LT	4	LT	4
08/14/91	LT	55	342	29	LT	6	LT	5	LT	5
11/25/91	LT	47	1173	61	LT	5	LT	4	LT	4
Yearly	--		774	780	--		--		--	
02/19/92	68	68	2016	101	LT	8	LT	7	LT	6
05/05/92	LT	94	1079	69	LT	9	LT	8	LT	6
08/18/92	70	48	1169	70	LT	6	LT	5	LT	5
11/10/92	LT	112	1147	76	LT	8	LT	9	LT	6
Yearly	69	3	1353	888	--		--		--	
02/23/93	LT	50	804	53	LT	4	LT	3	LT	4
05/06/93	LT	62	926	50	LT	4	LT	5	LT	3
08/18/93	LT	64	592	33	LT	3	LT	4	LT	2
11/22/93	LT	54	842	37	LT	3	LT	4		
Yearly	--		791	284	--		--		--	
03/21/94	21	26	791	38	LT	2	LT	3	LT	2
06/20/94	77	41	5923	83	LT	4	LT	4	8	4
08/23/94	31	19	1327	50	LT	3	LT	2	LT	2
11/28/94	22	22	1297	49	LT	3	LT	2	LT	2
Yearly	38	53	2335	4810	--		--		8	4
Overall	53	44	1313	1464	--		--		8	4

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLNG020 - Calvert Cliffs LNG Plant Pipeline Station 2										
02/13/91	271	+- 101	11055	+- 243	29	+- 15	LT 10		32	+- 11
05/01/91	LT 162		10460	+- 335	LT 19		LT 16		LT 17	
08/14/91	LT 240		9747	+- 409	LT 27		LT 24		LT 28	
11/25/91	184	+- 126	8865	+- 284	LT 17		LT 14		47	+- 21
Yearly	228	+- 123	10032	+- 1888	29	+- 15	--		40	+- 21
02/19/92	501	+- 188	10599	+- 318	LT 19		LT 15		43	+- 18
05/05/92	613	+- 91	9977	+- 219	LT 9		LT 8		23	+- 13
08/18/92	1671	+- 172	13898	+- 361	LT 15		47	+- 16	43	+- 18
11/10/92	815	+- 265	13983	+- 364	LT 18		33	+- 18	44	+- 21
Yearly	900	+- 1060	12114	+- 4249	--		40	+- 20	38	+- 20
02/23/93	270	+- 193	11641	+- 279	LT 14		LT 17		39	+- 16
05/06/93	LT 358		14055	+- 309	LT 16		LT 27		17	+- 14
08/18/93	LT 313		13405	+- 322	LT 16		LT 27		41	+- 15
11/22/93	LT 243		11847	+- 284	LT 14		LT 18		28	+- 15
Yearly	270	+- 193	12737	+- 2360	--		--		31	+- 22
03/21/94	245	+- 168	13617	+- 327	LT 14		LT 18		28	+- 20
06/20/94	180	+- 121	13521	+- 297	LT 8		LT 7		30	+- 16
08/23/94	93	+- 71	15924	+- 255	LT 11		LT 8		24	+- 11
11/28/94	212	+- 91	17617	+- 282	LT 12		LT 9		37	+- 12
Yearly	183	+- 131	15170	+- 3948	--		--		30	+- 11
Overall	395	+- 677	12513	+- 4231	29	+- 15	40	+- 20	35	+- 10

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLNG030 - Calvert Cliffs LNG Plant Pipeline Station 3										
02/13/91	LT	161	13806	387	LT	21	LT	17	LT	20
05/01/91	LT	10282	20029	1082	LT	137	LT	539	LT	76
08/14/91	LT	231	10380	436	LT	27	LT	24	LT	24
11/25/91	LT	206	14502	435	LT	26	LT	20	42	23
Yearly	--		14679	7991	--		--		42	23
02/19/92	LT	195	13413	429	LT	24	LT	20	LT	25
05/05/92	149	99	14409	346	LT	14	LT	11	43	19
08/18/92	309	178	15858	381	LT	15	LT	15	27	18
11/10/92	LT	183	13932	334	LT	15	LT	18	26	17
Yearly	229	226	14403	2104	--		--		32	19
02/23/93	LT	50	10154	406	LT	19	LT	14	LT	25
05/06/93	LT	248	15620	344	LT	16	LT	22	LT	14
08/18/93	LT	160	11519	230	LT	11	LT	14	LT	9
11/22/93	LT	241	12423	273	LT	14	LT	20	17	14
Yearly	--		12429	4646	--		--		17	14
03/21/94	LT	175	14927	328	LT	13	LT	17	20	11
06/20/94	605	155	17691	283	LT	13	8	9	20	11
08/23/94	LT	82	13669	301	LT	11	LT	9	22	15
11/28/94	LT	53	11326	181	LT	7	LT	6	LT	7
Yearly	605	155	14403	5303	--		8	9	21	2
Overall	417	532	13979	2083	--		8	9	28	23

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLNG040 - Calvert Cliffs LNG Plant Pipeline Station 4										
02/13/91	LT 200		16117	+- 355	LT 20		LT 19		LT 18	
05/01/91	LT 189		13101	+- 367	LT 20		LT 20		LT 18	
08/14/91	LT 1361		20063	+- 883	LT 53		LT 100		LT 40	
11/25/91	LT 139		14867	+- 297	LT 16		LT 14		LT 14	
Yearly	--		16037	+- 5911	--		--		--	
02/19/92	LT 314		15785	+- 379	LT 23		LT 26		LT 19	
05/05/92	LT 113		12630	+- 227	LT 9		LT 10		LT 8	
08/18/92	LT 226		16737	+- 335	LT 22		LT 21		LT 19	
11/10/92	LT 146		16765	+- 268	LT 11		LT 13		LT 10	
Yearly	--		15479	+- 3907	--		--		--	
02/23/93	LT 149		12599	+- 252	LT 10		LT 13		LT 9	
05/06/93	468	+- 377	18463	+- 332	LT 17		LT 31		LT 13	
08/18/93	LT 272		17889	+- 286	LT 14		LT 22		LT 11	
11/22/93	LT 240		16226	+- 292	LT 13		LT 19		LT 11	
Yearly	468	+- 377	16294	+- 5280	--		--		--	
03/21/94	LT 160		21194	+- 339	LT 13		LT 18		LT 13	
06/20/94	LT 90		18305	+- 293	LT 11		LT 10		LT 10	
08/23/94	LT 72		26416	+- 317	LT 10		LT 8		LT 10	
11/28/94	41	+- 66	19423	+- 272	LT 10		LT 8		7	+- 7
Yearly	41	+- 66	21335	+- 7181	--		--		7	+- 7
Overall	255	+- 604	17286	+- 5440	--		--		7	+- 7

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCCOV010 - Calvert Cliffs Cove Point Station 1									
02/13/91	LT 82		4603	+- 129	LT 9		LT 7		LT 7	
05/01/91	LT 76		3225	+- 123	LT 9		LT 7		LT 8	
08/14/91	60	+- 46	4389	+- 88	LT 5		LT 5		5	+- 3
11/25/91	67	+- 35	4899	+- 98	LT 4		LT 4		LT 4	
Yearly	64	+- 10	4279	+- 1466	--		--		5	+- 3
02/19/92	128	+- 52	5127	+- 113	LT 5		LT 5		LT 5	
05/05/92	141	+- 156	5263	+- 158	LT 13		LT 15		LT 9	
08/18/92	306	+- 108	4797	+- 173	LT 11		LT 9		LT 10	
11/10/92	LT 592		7056	+- 452	LT 38		LT 50		LT 30	
Yearly	192	+- 198	5561	+- 2032	--		--		--	
02/23/93	LT 149		4690	+- 103	LT 6		LT 11		LT 5	
05/06/93	97	+- 116	5654	+- 124	LT 7		LT 11		12	+- 7
08/18/93	LT 115		5776	+- 116	LT 6		LT 9		6	+- 4
11/22/93	LT 100		4271	+- 85	LT 5		LT 7		4	+- 3
Yearly	97	+- 116	5098	+- 1469	--		--		7	+- 8
03/21/94	473	+- 90	5417	+- 119	7	+- 6	LT 8		LT 5	
06/20/94	42	+- 46	4803	+- 106	LT 5		LT 5		LT 5	
08/23/94	72	+- 44	6038	+- 121	LT 6		LT 4		LT 5	
11/28/94	111	+- 46	4988	+- 100	LT 5		LT 4		LT 4	
Yearly	175	+- 402	5312	+- 1097	7	+- 6	--		--	
Overall	132	+- 123	5062	+- 1111	7	+- 6	--		6	+- 3

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCCOV020 - Calvert Cliffs Cove Point Station 2									
02/13/91	125	54	6759	135	4	5	LT 5		20	6
05/01/91	LT 116		6786	176	LT 11		LT 11		LT 10	
08/14/91	LT 84		7161	143	LT 6		LT 7		16	6
11/25/91	153	95	6572	184	LT 11		LT 9		LT 18	
Yearly	139	40	6820	494	4	5	--		18	6
02/19/92	118	58	6953	139	LT 6		LT 6		14	6
05/05/92	358	156	9232	277	LT 19		LT 17		32	15
08/18/92	290	74	8158	179	LT 7		LT 7		16	7
11/10/92	140	89	7744	155	LT 7		LT 9		17	7
Yearly	227	233	8022	1898	--		--		20	17
02/23/93	LT 154		6677	147	LT 8		LT 12		16	7
05/06/93	LT 220		9064	199	LT 11		LT 17		23	11
08/18/93	76	110	6635	133	LT 7		LT 11		14	6
11/22/93	141	141	8569	171	LT 9		LT 13		11	7
Yearly	109	92	7736	2527	--		--		16	10
03/21/94	357	116	8657	173	10	8	LT 11		16	12
06/20/94	16	20	7122	98	LT 3		LT 2		LT 2	
08/23/94	183	52	8456	135	LT 6		LT 5		11	6
11/28/94	84	48	9118	128	LT 6		LT 5		12	5
Yearly	160	296	8338	1714	10	8	--		13	5
Overall	159	100	7729	1309	7	8	--		17	6

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCOV030 - Calvert Cliffs Cove Point Station 3										
02/13/91	LT	146	14006	+- 280	LT	13	LT	13	21	+- 12
05/01/91	LT	103	11160	+- 246	LT	10	LT	10	14	+- 15
08/14/91	LT	377	11634	+- 465	LT	32	LT	37	LT	29
11/25/91	149	+- 95	13952	+- 335	LT	12	LT	9	25	+- 15
Yearly	149	+- 95	12688	+- 3007	--		--		20	+- 11
02/19/92	LT	140	13994	+- 308	LT	13	LT	13	29	+- 14
05/05/92	LT	188	15832	+- 380	LT	17	LT	17	35	+- 17
08/18/92	LT	137	16883	+- 371	LT	16	LT	14	29	+- 20
11/10/92	LT	366	13327	+- 373	LT	27	LT	31	LT	24
Yearly	--		15009	+- 3276	--		--		31	+- 7
02/23/93	LT	79	13370	+- 321	LT	12	LT	9	21	+- 13
05/06/93	LT	427	17023	+- 374	LT	21	LT	33	31	+- 18
08/18/93	LT	340	15993	+- 352	LT	18	LT	26	16	+- 10
11/22/93	LT	254	14019	+- 280	LT	14	LT	21	15	+- 11
Yearly	--		15101	+- 3397	--		--		21	+- 15
03/21/94	LT	107	7622	+- 183	LT	8	LT	11	10	+- 8
06/20/94	193	+- 159	23497	+- 376	LT	16	LT	16	23	+- 15
08/23/94	LT	92	14648	+- 322	LT	12	LT	10	16	+- 13
11/28/94	LT	122	17531	+- 351	LT	15	LT	13	19	+- 15
Yearly	193	+- 159	15825	+- 13188	--		--		17	+- 11
Overall	171	+- 62	14656	+- 2723	--		--		22	+- 12

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCOV040 - Calvert Cliffs Cove Point Station 4										
02/13/91	LT	125	31824	+- 509	LT 11		LT 11		LT 9	
05/01/91	90	+- 60	12562	+- 201	LT 7		LT 6		LT 7	
08/14/91	LT	242	13232	+- 370	LT 22		LT 24		LT 20	
11/25/91	LT	55	15684	+- 251	LT 8		LT 6		LT 8	
Yearly	90	+- 60	18326	+- 18197	--		--		--	
02/19/92	LT	260	16055	+- 321	LT 18		LT 23		LT 16	
05/05/92	LT	113	15829	+- 253	LT 9		LT 11		LT 8	
08/18/92	LT	217	15439	+- 340	LT 21		LT 21		LT 18	
11/10/92	LT	1400	4562	+- 620	LT 94		LT 125		LT 63	
Yearly	--		12971	+- 11224	--		--		--	
02/23/93	LT	271	16805	+- 269	LT 13		LT 21		LT 10	
05/06/93	LT	369	20725	+- 332	LT 16		LT 28		LT 12	
08/18/93	LT	197	18431	+- 295	LT 12		LT 17		LT 10	
11/22/93	LT	224	18258	+- 292	LT 12		LT 19		LT 10	
Yearly	--		18555	+- 3240	--		--		--	
03/21/94	LT	153	21910	+- 307	LT 13		LT 15		LT 12	
06/20/94	LT	99	19818	+- 317	LT 11		LT 10		LT 11	
08/23/94	LT	76	23098	+- 277	LT 10		LT 8		LT 10	
11/28/94	LT	66	19825	+- 238	LT 8		LT 7		LT 8	
Yearly	--		21163	+- 3246	--		--		--	
Overall	90	+- 60	17754	+- 6876	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLCP010 - Calvert Cliffs Little Cove Point Station 1										
02/13/91	LT 129		11632	+- 233	LT 11		LT 10		LT 10	
05/01/91	LT 148		8338	+- 267	LT 16		LT 15		LT 15	
08/14/91	LT 56		9154	+- 165	LT 6		LT 6		LT 7	
11/25/91	LT 66		11073	+- 221	LT 8		LT 7		LT 8	
Yearly	--		10049	+- 3116	--		--		--	
02/19/92	LT 76		9161	+- 165	LT 7		LT 7		9	+- 5
05/05/92	LT 242		10471	+- 251	LT 16		LT 20		LT 14	
08/18/92	LT 193		11036	+- 265	LT 17		LT 18		LT 15	
11/10/92	LT 693		14628	+- 731	LT 44		LT 60		LT 38	
Yearly	--		11324	+- 4677	--		--		9	+- 5
02/23/93	LT 211		9942	+- 179	LT 9		LT 16		LT 8	
05/06/93	LT 74		6983	+- 126	LT 5		LT 7		LT 5	
08/18/93	LT 146		11258	+- 180	LT 9		LT 12		LT 7	
11/22/93	LT 394		15724	+- 252	LT 12		LT 31		LT 10	
Yearly	--		10977	+- 7270	--		--		--	
03/21/94	LT 161		14510	+- 261	LT 12		LT 17		LT 11	
06/20/94	LT 97		12810	+- 231	LT 10		LT 9		LT 9	
08/23/94	LT 52		8081	+- 162	LT 7		LT 5		LT 7	
11/28/94	LT 109		16194	+- 324	LT 12		LT 11		9	+- 11
Yearly	--		12899	+- 6993	--		--		9	+- 11
Overall	--		11312	+- 2373	--		--		9	+- 0

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLCP020 - Calvert Cliffs Little Cove Point Station 2										
02/13/91	LT	99	15018	+- 330	LT	12	LT	10	LT	13
05/01/91	168	+- 92	13351	+- 294	LT	11	LT	9	LT	12
08/14/91	LT	138	16660	+- 333	LT	13	LT	13	LT	12
11/25/91	LT	83	14863	+- 327	LT	11	LT	9	LT	12
Yearly	168	+- 92	14973	+- 2706	--		--		--	
02/19/92	123	+- 149	14456	+- 318	LT	13	LT	15	LT	13
05/05/92	LT	182	14913	+- 328	LT	13	LT	16	LT	13
08/18/92	203	+- 95	15159	+- 333	LT	14	18	+- 10	40	+- 17
11/10/92	LT	770	19855	+- 874	LT	50	LT	69	LT	38
Yearly	163	+- 113	16096	+- 5046	--		18	+- 10	40	+- 17
02/23/93	LT	204	11985	+- 264	LT	13	LT	17	LT	11
05/06/93	LT	499	18635	+- 410	LT	21	LT	38	33	+- 23
08/18/93	LT	320	19914	+- 398	LT	18	LT	27	LT	17
11/22/93	LT	310	16172	+- 323	LT	15	LT	25	LT	12
Yearly	--		16677	+- 6984	--		--		33	+- 23
03/21/94	LT	230	18302	+- 403	LT	17	LT	25	LT	15
06/20/94	LT	112	19640	+- 314	LT	12	LT	11	8	+- 10
08/23/94	LT	94	20202	+- 323	LT	12	LT	10	LT	12
11/28/94	38	+- 50	12966	+- 182	LT	7	LT	7	6	+- 6
Yearly	38	+- 50	17778	+- 6610	--		--		7	+- 3
Overall	123	+- 147	16381	+- 2338	--		18	+- 10	27	+- 35

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCDRP010 - Calvert Cliffs Drum Point Station 1										
05/01/91	LT	199	11226	292	LT	19	LT	19	LT	18
08/14/91	LT	209	9228	332	LT	21	LT	21	LT	20
11/25/91	55	50	8660	156	LT	7	LT	5	7	8
Yearly	55	50	9705	2696	--		--		7	8
02/19/92	LT	244	10667	277	LT	19	LT	21	LT	17
05/05/92	LT	328	12153	340	LT	23	LT	27	34	20
08/18/92	240	113	12595	252	LT	11	LT	11	22	11
11/10/92	107	154	12221	244	LT	12	LT	14	22	11
Yearly	174	188	11909	1701	--		--		26	14
02/23/93	LT	240	9417	207	LT	11	LT	18	14	10
05/06/93	LT	281	10502	210	LT	11	LT	213	19	10
08/18/93	LT	170	12410	248	LT	11	LT	15	LT	11
11/22/93	LT	275	12438	274	LT	13	LT	22	22	15
Yearly	--		11192	2981	--		--		18	8
03/21/94	LT	177	13387	295	LT	13	LT	19	24	14
06/20/94	44	69	13616	191	LT	9	LT	8	26	10
08/23/94	129	103	12195	244	LT	10	LT	8	16	10
11/28/94	169	95	12430	224	LT	10	LT	8	20	14
Yearly	114	128	12907	1399	--		--		22	9
Overall	114	119	11428	2694	--		--		18	16

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCDRP020 - Calvert Cliffs Drum Point Station 2									
02/13/91	LT	196	16656	+- 333	LT	16	LT	16	LT	14
05/01/91	LT	255	12935	+- 362	LT	22	LT	22	LT	19
08/14/91	LT	341	12544	+- 502	LT	36	LT	37	LT	30
11/25/91	LT	297	16645	+- 499	LT	30	LT	27	LT	29
Yearly	--		14695	+- 4527	--		--		--	
02/19/92	LT	383	11971	+- 431	LT	28	LT	32	LT	24
05/05/92	LT	444	15955	+- 479	LT	33	LT	37	LT	28
08/18/92	LT	192	15796	+- 474	LT	26	LT	19	LT	24
11/10/92	LT	263	17829	+- 428	LT	19	LT	23	19	+- 16
Yearly	--		15388	+- 4916	--		--		19	+- 16
02/23/93	LT	350	14400	+- 288	LT	15	LT	25	25	+- 16
05/06/93	LT	641	18728	+- 449	LT	23	LT	45	54	+- 28
08/18/93	LT	300	19963	+- 439	LT	19	LT	25	LT	17
11/22/93	LT	307	14490	+- 290	LT	14	LT	24	LT	11
Yearly	--		16895	+- 5748	--		--		40	+- 41
03/21/94	LT	260	19707	+- 394	LT	18	LT	26	LT	16
06/20/94	254	+- 171	19351	+- 426	LT	18	LT	16	17	+- 14
08/23/94	LT	103	18186	+- 291	LT	12	LT	10	LT	12
11/28/94	LT	96	17447	+- 279	LT	11	LT	9	LT	11
Yearly	254	+- 171	18673	+- 2088	--		--		17	+- 14
Overall	254	+- 171	16413	+- 3529	--		--		25	+- 25

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCWES010 - Calvert Cliffs Western Shore Station 1										
02/13/91	LT 5		3	+- 4	LT 5		LT 10		LT 12	
05/01/91	LT 4		3	+- 5	LT 5		LT 9		LT 10	
08/14/91	LT 5		5	+- 4	LT 10		LT 11		LT 14	
11/25/91	LT 6		8	+- 5	LT 7		LT 10		LT 14	
Yearly	--		5	+- 5	--		--		--	
02/19/92	LT 10		LT 5		LT 6		LT 10		LT 13	
05/05/92	LT 11		8	+- 4	LT 12		LT 20		LT 26	
08/18/92	LT 10		LT 8		LT 10		LT 16		LT 19	
11/10/92	LT 1		LT 2		LT 4		LT 10		LT 7	
Yearly	--		8	+- 4	--		--		--	
02/23/93	LT 19		LT 2		LT 4		LT 93		LT 8	
05/06/93	LT 2		5	+- 2	LT 7		LT 5		LT 10	
08/18/93	LT 3		10	+- 3	LT 8		LT 7		LT 15	
11/22/93	LT 2		5	+- 2	LT 6		LT 5		LT 11	
Yearly	--		7	+- 6	--		--		--	
03/21/94	LT 2		6	+- 3	LT 3		LT 5		LT 7	
06/20/94	LT 2		7	+- 3	LT 4		LT 6		LT 7	
08/23/94	LT 2		6	+- 3	LT 3		LT 5		LT 5	
11/28/94	LT 2		8	+- 3	LT 3		LT 5		LT 5	
Yearly	--		7	+- 2	--		--		--	
Overall	--		7	+- 3	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCWES020 - Calvert Cliffs Western Shore Station 2										
02/13/91	LT 7		23	+- 9	LT 8		LT 15		LT 17	
05/01/91	LT 15		LT 17		LT 184		LT 45		LT 362	
08/14/91	LT 4		15	+- 6	LT 9		LT 10		LT 13	
11/25/91	LT 5		20	+- 8	LT 8		LT 10		LT 12	
Yearly	--		19	+- 8	--		--		--	
02/19/92	LT 6		16	+- 4	LT 6		LT 10		LT 12	
05/05/92	LT 7		37	+- 10	LT 20		LT 13		LT 22	
08/18/92	LT 2		10	+- 2	LT 2		LT 4		LT 4	
11/10/92	LT 4		76	+- 4	LT 9		LT 11		LT 16	
Yearly	--		35	+- 60	--		--		--	
02/23/93	LT 2		23	+- 3	LT 3		LT 5		LT 7	
05/06/93	LT 2		11	+- 2	LT 5		LT 4		LT 12	
08/18/93	LT 2		15	+- 3	LT 7		LT 6		LT 11	
11/22/93	LT 4		65	+- 4	LT 11		LT 10		LT 20	
Yearly	--		29	+- 50	--		--		--	
03/21/94	LT 3		38	+- 4	LT 4		LT 8		LT 10	
06/20/94	LT 2		25	+- 3	LT 3		LT 4		LT 5	
08/23/94	LT 1		10	+- 2	LT 2		LT 3		LT 3	
11/28/94	LT 1		10	+- 2	LT 1		LT 3		LT 3	
Yearly	--		21	+- 27	--		--		--	
Overall	--		26	+- 14	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCWES030 - Calvert Cliffs Western Shore Station 3									
02/13/91	LT 20		492	+- 37	LT 27		LT 56		LT 61	
05/01/91	LT 23		612	+- 33	LT 27		LT 51		LT 65	
08/14/91	LT 19		356	+- 40	LT 33		LT 56		LT 79	
11/25/91	LT 22		515	+- 48	LT 26		LT 58		LT 59	
Yearly	--		494	+- 211	--		--		--	
02/19/92	LT 23		457	+- 36	LT 22		LT 46		LT 54	
05/05/92	LT 10		532	+- 23	LT 23		LT 30		LT 46	
08/18/92	LT 8		558	+- 20	LT 10		LT 21		LT 16	
11/10/92	LT 8		478	+- 19	LT 34		LT 25		LT 34	
Yearly	--		506	+- 94	--		--		--	
02/23/93	LT 10		575	+- 23	LT 13		LT 28		LT 29	
05/06/93	LT 10		544	+- 20	LT 24		LT 30		LT 50	
08/18/93	LT 12		724	+- 27	LT 40		LT 40		LT 91	
11/22/93	LT 8		562	+- 21	LT 22		LT 26		LT 50	
Yearly	--		601	+- 166	--		--		--	
03/21/94	LT 9		631	+- 25	LT 17		LT 26		LT 34	
06/20/94	LT 8		516	+- 19	LT 11		LT 20		LT 24	
08/23/94	LT 7		386	+- 18	LT 9		LT 20		LT 19	
11/28/94	LT 7		458	+- 18	LT 9		LT 21		LT 20	
Yearly	--		498	+- 207	--		--		--	
Overall	--		525	+- 103	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCWES040 - Calvert Cliffs Western Shore Station 4										
02/13/91	LT 20		358	+- 34	LT 32		LT 60		LT 72	
05/01/91	LT 15		245	+- 21	LT 10		LT 33		LT 44	
08/14/91	LT 17		366	+- 42	LT 33		LT 56		LT 78	
11/25/91	LT 20		263	+- 36	LT 22		LT 53		LT 51	
Yearly	--		308	+- 126	--		--		+-	
02/19/92	LT 6		258	+- 13	LT 19		LT 16		LT 10	
05/05/92	LT 9		343	+- 19	LT 13		LT 24		LT 29	
08/18/92	LT 9		262	+- 18	LT 14		LT 26		LT 27	
11/10/92	LT 65		576	+- 105	LT 142		LT 176		LT 365	
Yearly	--		360	+- 299	--		--		--	
02/23/93	LT 8		360	+- 19	LT 16		LT 26		LT 36	
05/06/93	LT 11		212	+- 20	LT 30		LT 35		LT 64	
08/18/93	LT 10		221	+- 18	LT 36		LT 35		LT 89	
11/22/93	LT 7		304	+- 9	LT 20		LT 24		LT 46	
Yearly	--		274	+- 141	--		--		--	
03/21/94	LT 8		233	+- 17	LT 15		LT 25		LT 34	
06/20/94	LT 8		297	+- 17	LT 12		LT 23		LT 25	
08/23/94	LT 7		388	+- 16	LT 9		LT 20		LT 20	
11/28/94	LT 7		235	+- 13	LT 9		LT 19		LT 18	
Yearly	--		288	+- 146	--		--		--	
Overall	--		308	+- 75	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCFLP010 - Calvert Cliffs Flag Pond Station 1									
02/13/91	LT 5		LT 6		LT 5		LT 9		LT 11	
05/01/91	LT 4		LT 4		LT 4		LT 8		LT 9	
08/14/91	LT 5		LT 5		LT 8		LT 12		LT 15	
11/25/91	LT 5		LT 4		LT 5		LT 8		LT 11	
Yearly	--		--		--		--		--	
02/19/92	LT 1		3	+- 1	LT 12		LT 3		LT 4	
05/05/92	LT 8		LT 6		LT 8		LT 14		LT 18	
08/18/92	LT 7		LT 5		LT 15		LT 12		LT 10	
11/10/92	LT 94		LT 2		LT 4		LT 7		LT 4	
Yearly	--		3	+- 1	--		--		--	
02/23/93	LT 2		6	+- 2	LT 4		LT 4		LT 7	
05/06/93	LT 2		6	+- 3	LT 8		LT 7		LT 16	
08/18/93	LT 2		5	+- 2	LT 9		LT 7		LT 18	
11/22/93	LT 2		4	+- 2	LT 27		LT 5		LT 10	
Yearly	--		5	+- 2	--		--		--	
03/21/94	LT 2		5	+- 3	LT 3		LT 4		LT 7	
06/20/94	LT 2		2	+- 2	LT 3		LT 4		LT 5	
08/23/94	LT 2		4	+- 2	LT 2		LT 4		LT 4	
11/28/94	LT 2		3	+- 3	LT 3		LT 4		LT 5	
Yearly	--		4	+- 3	--		--		--	
Overall	--		4	+- 2	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCFLP020 - Calvert Cliffs Flag Pond Station 2									
02/13/91	LT 10		106	+- 17	LT 13		LT 19		LT 26	
05/01/91	LT 15		86	+- 12	LT 21		LT 88		LT 21	
08/14/91	LT 9		68	+- 12	LT 21		LT 25		LT 45	
11/25/91	LT 11		93	+- 15	LT 35		LT 19		LT 22	
Yearly	--		88	+- 32	--		--		--	
02/19/92	LT 4		62	+- 4	LT 17		LT 13		LT 32	
05/05/92	LT 4		73	+- 4	LT 6		LT 10		LT 13	
08/18/92	LT 10		178	+- 16	LT 10		LT 21		LT 24	
11/10/92	LT 3		70	+- 4	LT 8		LT 9		LT 16	
Yearly	--		96	+- 110	--		--		--	
02/23/93	LT 4		64	+- 4	LT 8		LT 11		LT 29	
05/06/93	LT 4		54	+- 4	LT 11		LT 11		LT 20	
08/18/93	LT 5		86	+- 7	LT 21		LT 17		LT 41	
11/22/93										
Yearly	--		68	+- 33	--		--		--	
03/21/94	LT 3		51	+- 4	LT 6		LT 10		LT 13	
06/20/94	LT 5		58	+- 4	LT 9		LT 14		LT 16	
08/23/94	LT 3		56	+- 4	LT 4		LT 8		LT 8	
11/28/94	LT 3		46	+- 4	LT 5		LT 8		LT 9	
Yearly	--		53	+- 11	--		--		--	
Overall	--		76	+- 39	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCFLP030 - Calvert Cliffs Flag Pond Station 3										
02/13/91	LT 23		582	+- 38	LT 34		LT 47		LT 52	
05/01/91	LT 16		277	+- 32	LT 27		LT 49		LT 60	
08/14/91	LT 22		448	+- 32	LT 19		LT 50		LT 94	
11/25/91	LT 19		305	+- 34	LT 23		LT 49		LT 52	
Yearly	--		403	+- 282	--		--		--	
02/19/92	LT 7		347	+- 15	LT 56		LT 22		LT 33	
05/05/92	LT 9		338	+- 19	LT 17		LT 27		LT 36	
08/18/92	LT 28		512	+- 66	LT 115		LT 84		LT 157	
11/10/92	LT 7		378	+- 7	LT 38		LT 20		LT 30	
Yearly	--		394	+- 161	--		--		--	
02/23/93	LT 7		329	+- 14	LT 17		LT 22		LT 61	
05/06/93	LT 9		456	+- 10	LT 26		LT 27		LT 54	
08/18/93	LT 9		461	+- 11	LT 35		LT 33		LT 53	
11/22/93										
Yearly	--		415	+- 150	--		--		--	
03/21/94	LT 8		540	+- 19	LT 15		LT 25		LT 33	
06/20/94	LT 7		495	+- 16	LT 11		LT 20		LT 23	
08/23/94	LT 6		341	+- 13	LT 7		LT 15		LT 15	
11/28/94	LT 9		522	+- 20	LT 12		LT 24		LT 25	
Yearly	--		475	+- 182	--		--		--	
Overall	--		422	+- 73	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCFLP040 - Calvert Cliffs Flag Pond Station 4									
02/13/91	LT 19		313	+- 34	LT 22		LT 42		LT 52	
05/01/91	LT 15		184	+- 28	LT 24		LT 45		LT 56	
08/14/91	LT 25		253	+- 33	LT 27		LT 61		LT 112	
11/25/91	LT 16		129	+- 30	LT 20		LT 46		LT 47	
Yearly	--		220	+- 160	--		--		--	
02/19/92	LT 35		233	+- 35	LT 37		LT 231		LT 97	
05/05/92	LT 31		243	+- 40	LT 51		LT 74		LT 135	
08/18/92	LT 27		213	+- 36	LT 34		LT 62		LT 79	
11/10/92	LT 8		186	+- 15	LT 17		LT 25		LT 39	
Yearly	--		219	+- 50	--		--		--	
02/23/93	LT 8		162	+- 15	LT 21		LT 27		LT 45	
05/06/93	LT 10		258	+- 20	21	+- 25	LT 36		LT 68	
08/18/93	LT 12		263	+- 20	LT 58		LT 40		LT 99	
11/22/93										
Yearly	--		228	+- 114	21	+- 25	--		--	
03/21/94	LT 10		247	+- 10	LT 17		LT 28		LT 38	
06/20/94	LT 9		231	+- 17	LT 13		LT 26		LT 29	
08/23/94	LT 9		436	+- 20	LT 11		LT 23		LT 24	
11/28/94	LT 8		214	+- 15	LT 11		LT 22		LT 26	
Yearly	--		282	+- 207	--		--		--	
Overall	--		237	+- 60	21	+- 25	--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCCO010 - Calvert Cliffs Outfall Station 1										
02/13/91	LT 6		LT 5		LT 6		LT 9		LT 11	
05/01/91	LT 11		LT 5		LT 5		LT 10		LT 12	
08/14/91	LT 2		7	+- 3	LT 5		LT 5		LT 10	
11/25/91	LT 3		7	+- 4	LT 3		LT 5		LT 6	
Yearly	--		7	-- 0	--		--		--	
02/19/92	LT 8		LT 6		LT 25		LT 16		LT 38	
05/05/92	LT 9		LT 6		LT 12		LT 17		LT 26	
08/18/92	LT 59		LT 39		LT 83		LT 251		LT 181	
11/10/92	LT 6		LT 6		LT 10		LT 12		LT 22	
Yearly	--		--		--		--		--	
02/23/93	LT 2		8	+- 3	LT 6		LT 6		LT 8	
05/06/93	LT 3		8	+- 3	LT 8		LT 7		LT 16	
08/18/93	LT 3		6	+- 3	LT 11		LT 8		LT 22	
11/22/93	LT 2		6	+- 3	LT 34		LT 6		LT 12	
Yearly	--		7	+- 2	--		--		--	
03/21/94	LT 2		6	+- 2	LT 4		LT 5		LT 9	
06/20/94	LT 2		8	+- 2	LT 2		LT 4		LT 5	
08/23/94	LT 2		6	+- 3	LT 3		LT 5		LT 6	
11/28/94	LT 2		5	+- 3	LT 3		LT 5		LT 5	
Yearly	--		6	+- 3	--		--		--	
Overall	--		7	+- 1	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCCCO020 - Calvert Cliffs Outfall Station 2									
02/13/91	LT 5		8	+- 6	LT 7		LT 12		LT 15	
05/01/91	LT 4		9	+- 4	LT 6		LT 9		LT 12	
08/14/91	LT 2		9	+- 2	LT 3		LT 4		LT 7	
11/25/91	LT 2		10	+- 2	LT 13		LT 4		LT 6	
Yearly	--		9	+- 2	--		--		--	
02/19/92	LT 11		LT 8		LT 35		LT 22		LT 37	
05/05/92	LT 16		18	+- 18	LT 27		LT 38		LT 57	
08/18/92	LT 10		28	+- 10	LT 39		LT 18		LT 23	
11/10/92	LT 1		LT 2		LT 4		LT 9		LT 8	
Yearly	--		23	+- 14	--		--		--	
02/23/93	LT 3		18	+- 3	LT 12		LT 8		LT 35	
05/06/93	LT 2		14	+- 2	LT 6		LT 5		LT 10	
08/18/93	LT 2		8	+- 3	LT 10		LT 7		LT 17	
11/22/93	LT 2		7	+- 2	LT 30		LT 5		LT 10	
Yearly	--		12	+- 10	--		--		--	
03/21/94	LT 2		11	+- 3	LT 4		LT 5		LT 9	
06/20/94	LT 2		10	+- 3	LT 4		LT 5		LT 7	
08/23/94	LT 2		7	+- 2	LT 2		LT 4		LT 3	
11/28/94	LT 2		15	+- 3	LT 3		LT 6		LT 6	
Yearly	--		11	+- 7	--		--		--	
Overall	--		14	+- 13	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCCO030 - Calvert Cliffs Outfall Station 3										
02/13/91	LT 8		562	+- 19	LT 12		LT 23		LT 25	
05/01/91	LT 8		523	+- 20	LT 15		LT 24		LT 32	
08/14/91	LT 9		344	+- 19	LT 13		LT 24		LT 28	
11/25/91	LT 7		366	+- 18	LT 24		LT 18		LT 11	
Yearly	--		449	+- 220	--		--		--	
02/19/92	LT 8		281	+- 18	LT 43		LT 26		LT 28	
05/05/92	LT 9		342	+- 19	LT 21		LT 29		LT 42	
08/18/92	LT 8		328	+- 21	LT 10		LT 24		LT 22	
11/10/92	LT 8		379	+- 17	LT 45		LT 24		LT 34	
Yearly	--		333	+- 81	--		--		--	
02/23/93	LT 8		455	+- 20	LT 19		LT 26		LT 31	
05/06/93	LT 9		489	+- 20	LT 32		LT 30		LT 76	
08/18/93	LT 9		473	+- 20	LT 39		LT 32		LT 79	
11/22/93	LT 7		281	+- 6	LT 20		LT 24		LT 45	
Yearly	--		425	+- 193	--		--		--	
03/21/94	LT 8		372	+- 19	LT 16		LT 24		LT 34	
06/20/94	LT 4		407	+- 16	LT 7		LT 12		LT 16	
08/23/94	LT 9		341	+- 18	LT 11		LT 23		LT 17	
11/28/94	LT 9		350	+- 19	LT 12		LT 26		LT 25	
Yearly	--		368	+- 59	--		--		--	
Overall	--		393	+- 106	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCO040 - Calvert Cliffs Outfall Station 4										
05/01/91	LT 6		299	+- 13	LT 7		LT 16		LT 10	
08/14/91	LT 7		207	+- 14	LT 10		LT 22		LT 7	
11/25/91	LT 20		463	+- 29	LT 20		LT 41		LT 52	
Yearly	--		323	+- 259	--		--		--	
02/19/92	LT 28		312	+- 32	LT 38		LT 166		LT 101	
05/05/92	LT 9		219	+- 17	LT 19		LT 29		LT 6	
08/18/92	LT 23		206	+- 33	LT 30		LT 53		LT 70	
11/10/92	LT 10		305	+- 19	LT 20		LT 29		LT 30	
Yearly	--		261	+- 112	--		--		--	
02/23/93	LT 8		273	+- 15	LT 21		LT 24		LT 45	
05/06/93	LT 11		260	+- 18	LT 36		LT 36		LT 55	
08/18/93	LT 11		320	+- 21	LT 44		LT 40		LT 98	
11/22/93	LT 9		445	+- 19	LT 26		LT 29		LT 55	
Yearly	--		325	+- 169	--		--		--	
03/21/94	LT 9		335	+- 19	LT 19		LT 29		LT 53	
06/20/94	LT 9		282	+- 19	LT 15		LT 27		LT 29	
08/23/94	LT 7		202	+- 14	LT 9		LT 19		LT 19	
11/28/94	LT 8		340	+- 10	LT 11		LT 21		LT 22	
Yearly	--		290	+- 128	--		--		--	
Overall	--		299	+- 61	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCROP010 - Calvert Cliffs Rocky Point Station 1										
02/13/91	LT 7		LT 6		LT 254		LT 28		LT 541	
05/01/91	LT 5		LT 5		LT 7		LT 11		LT 13	
08/14/91	LT 2		6	+- 2	LT 3		LT 4		LT 10	
11/25/91	LT 2		7	+- 2	LT 3		LT 4		LT 5	
Yearly	--		7	+- 1	--		--		--	
02/19/92	LT 2		2	+- 2	LT 20		LT 4		LT 5	
05/05/92	LT 9		3	+- 4	LT 12		LT 16		LT 25	
08/18/92	LT 8		LT 6		LT 8		LT 13		LT 15	
11/10/92	LT 7		LT 6		LT 11		LT 13		LT 23	
Yearly	--		3	+- 1	--		--		--	
02/23/93	LT 2		3	+- 2	LT 3		LT 4		LT 6	
05/06/93	LT 3		6	+- 3	LT 9		LT 7		LT 18	
08/18/93	LT 2		LT 3		LT 71		LT 7		LT 19	
11/22/93	LT 2		5	+- 2	LT 6		LT 5		LT 12	
Yearly	--		5	+- 3	--		--		--	
03/21/94	LT 2		2	+- 2	LT 4		LT 4		LT 5	
06/20/94	LT 6		6	+- 2	LT 11		LT 15		LT 21	
08/23/94	LT 2		5	+- 3	LT 3		LT 5		LT 6	
11/28/94	LT 2		4	+- 2	LT 3		LT 5		LT 5	
Yearly	--		4	+- 3	--		--		--	
Overall	--		4	+- 3	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
	Station CCROP020 - Calvert Cliffs Rocky Point Station 2									
02/13/91	LT 4		3	+- 5	LT 5		LT 8		LT 12	
05/01/91	LT 8		LT 4		LT 4		LT 9		LT 10	
08/14/91	LT 3		120	+- 3	LT 5		LT 8		LT 3	
11/25/91	LT 2		4	+- 2	LT 9		LT 3		LT 4	
Yearly	--		42	+- 135	--		--		--	
02/19/92	LT 2		11	+- 2	LT 4		LT 4		LT 8	
05/05/92	LT 7		2	+- 4	LT 21		LT 12		LT 18	
08/18/92	LT 7		LT 6		LT 7		LT 12		LT 15	
11/10/92	LT 1		LT 2		LT 4		LT 8		LT 8	
Yearly	--		7	+- 13	--		--		--	
02/23/93	LT 2		6	+- 2	LT 7		LT 5		LT 9	
05/06/93	LT 2		15	+- 3	LT 11		LT 7		LT 17	
08/18/93	LT 2		4	+- 2	LT 9		LT 6		LT 17	
11/22/93	LT 1		6	+- 2	LT 5		LT 4		LT 10	
Yearly	--		8	+- 10	--		--		--	
03/21/94	LT 2		5	+- 2	LT 4		LT 4		LT 7	
06/20/94	LT 2		16	+- 2	LT 3		LT 5		LT 6	
08/23/94	LT 1		3	+- 2	LT 2		LT 3		LT 4	
11/28/94	LT 1		5	+- 1	LT 2		LT 3		LT 3	
Yearly	--		7	+- 12	--		--		--	
Overall	--		16	+- 35	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCROP030 - Calvert Cliffs Rocky Point Station 3										
02/13/91	LT 21		317	+- 39	LT 22		LT 45		LT 48	
05/01/91	LT 7		266	+- 16	LT 9		LT 19		LT 9	
08/14/91	LT 22		467	+- 34	LT 33		LT 50		LT 81	
11/25/91	LT 22		344	+- 34	LT 11		LT 47		LT 52	
Yearly	--		349	+- 171	--		--		--	
02/19/92	LT 7		226	+- 15	LT 23		LT 20		LT 20	
05/05/92	LT 23		282	+- 34	LT 21		LT 49		LT 61	
08/18/92	LT 8		233	+- 16	LT 14		LT 23		LT 31	
11/10/92	LT 8		277	+- 17	LT 44		LT 25		LT 31	
Yearly	--		255	+- 58	--		--		--	
02/23/93	LT 8		269	+- 17	LT 13		LT 24		LT 22	
05/06/93	LT 9		336	+- 18	LT 33		LT 32		LT 69	
08/18/93	LT 13		330	+- 15	LT 130		LT 45		LT 116	
11/22/93	LT 10		279	+- 17	LT 29		LT 32		LT 65	
Yearly	--		304	+- 69	--		--		--	
03/21/94	LT 10		338	+- 21	LT 21		LT 30		LT 60	
06/20/94	LT 7		278	+- 8	LT 12		LT 19		LT 24	
08/23/94	LT 9		282	+- 18	LT 12		LT 24		LT 25	
11/28/94	LT 11		404	+- 22	LT 15		LT 29		LT 32	
Yearly	--		326	+- 118	--		--		--	
Overall	--		308	+- 80	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCROP040 - Calvert Cliffs Rocky Point Station 4										
02/13/91	LT 16		434 +- 32		LT 22		LT 37		LT 52	
05/01/91	LT 6		262 +- 13		LT 8		LT 17		LT 8	
08/14/91	LT 6		247 +- 13		LT 11		LT 18		LT 9	
11/25/91	LT 22		589 +- 38		LT 21		LT 45		LT 51	
Yearly	--		383 +- 323		--		--		--	
02/19/92	LT 28		LT 33		LT 22		LT 174		LT 71	
05/05/92	LT 21		300 +- 29		LT 21		LT 44		LT 54	
08/18/92	LT 8		380 +- 17		LT 14		LT 24		LT 41	
11/10/92	LT 61		528 +- 101		LT 135		LT 144		LT 328	
Yearly	--		403 +- 231		--		--		--	
02/23/93	LT 6		176 +- 12		LT 19		LT 21		LT 28	
05/06/93	LT 9		357 +- 18		LT 35		LT 31		LT 77	
08/18/93	LT 9		504 +- 18		LT 109		LT 31		LT 89	
11/22/93	LT 6		237 +- 8		LT 22		LT 23		LT 48	
Yearly	--		319 +- 289		--		--		--	
03/21/94	LT 9		341 +- 11		LT 20		LT 28		LT 42	
06/20/94	49 +- 12		547 +- 18		LT 12		LT 22		LT 22	
08/23/94	LT 6		250 +- 13		LT 9		LT 17		LT 18	
11/28/94	LT 7		179 +- 8		LT 10		LT 20		LT 22	
Yearly	49 +- 12		329 +- 319		--		--		--	
Overall	49 +- 12		358 +- 82		--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLNG010 - Calvert Cliffs LNG Plant Pipeline Station 1										
02/13/91	LT 5		LT 5		LT 6		LT 10		LT 13	
05/01/91	LT 8		LT 5		LT 17		LT 12		LT 11	
08/14/91	LT 4		LT 5		LT 7		LT 10		LT 14	
11/25/91	LT 6		LT 5		LT 10		LT 9		LT 12	
Yearly	--		--		--		--		--	
02/19/92	LT 11		7	+- 7	LT 28		LT 123		LT 21	
05/05/92	LT 10		LT 7		LT 10		LT 17		LT 22	
08/18/92	LT 8		LT 6		LT 6		LT 13		LT 14	
11/10/92	LT 6		LT 6		LT 10		LT 12		LT 23	
Yearly	--		7	+- 7	--		--		--	
02/23/93	LT 1		LT 2		LT 3		LT 11		LT 6	
05/06/93	LT 2		7	+- 2	LT 6		LT 6		LT 12	
08/18/93	LT 2		2	+- 2	LT 6		LT 4		LT 12	
11/22/93	LT 2		3	+- 2	LT 6		LT 4		LT 11	
Yearly	--		4	+- 5	--		--		--	
03/21/94	LT 2		4	+- 2	LT 4		LT 4		LT 7	
06/20/94	LT 3		61	+- 4	LT 5		LT 7		LT 10	
08/23/94	LT 2		4	+- 2	LT 3		LT 5		LT 6	
11/28/94	LT 2		6	+- 3	LT 3		LT 5		LT 4	
Yearly	--		19	+- 56	--		--		--	
Overall	--		10	+- 16	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLNG020 - Calvert Cliffs LNG Plant Pipeline Station 2										
02/13/91	LT 9		42	+- 9	LT 11		LT 19		LT 11	
05/01/91	LT 26		211	+- 29	LT 32		LT 38		LT 52	
08/14/91	LT 18		136	+- 29	LT 30		LT 53		LT 66	
11/25/91	LT 15		137	+- 23	LT 18		LT 32		LT 38	
Yearly	--		132	+- 138	--		--		--	
02/19/92	LT 18		169	+- 26	LT 16		LT 35		LT 41	
05/05/92	LT 6		123	+- 10	LT 8		LT 16		LT 13	
08/18/92	LT 10		176	+- 18	20	+- 16	LT 26		LT 32	
11/10/92	LT 11		186	+- 12	LT 22		LT 30		LT 47	
Yearly	--		164	+- 56	20	+- 16	--		--	
02/23/93	LT 8		156	+- 12	LT 21		LT 24		LT 41	
05/06/93	LT 9		190	+- 15	LT 32		LT 30		LT 104	
08/18/93	LT 9		162	+- 17	LT 33		LT 31		LT 70	
11/22/93	LT 8		148	+- 13	LT 25		LT 25		LT 55	
Yearly	--		164	+- 37	--		--		--	
03/21/94	LT 8		176	+- 15	LT 17		LT 26		LT 39	
06/20/94	LT 5		155	+- 13	LT 8		LT 14		LT 13	
08/23/94	LT 7		192	+- 8	LT 10		LT 19		LT 21	
11/28/94	LT 7		210	+- 10	LT 11		LT 19		LT 23	
Yearly	--		183	+- 47	--		--		--	
Overall	--		161	+- 43	20	+- 16	--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLNG030 - Calvert Cliffs LNG Plant Pipeline Station 3										
02/13/91	LT 17		262	+- 26	LT 20		LT 36		LT 46	
05/01/91	LT 66		134	+- 76	LT 752		LT 237		LT 1702	
08/14/91	LT 17		281	+- 35	LT 29		LT 53		LT 69	
11/25/91	LT 22		344	+- 36	LT 23		LT 45		LT 57	
Yearly	--		255	+- 176	--		--		--	
02/19/92	LT 23		307	+- 37	LT 23		LT 50		LT 57	
05/05/92	LT 9		218	+- 17	LT 29		LT 26		LT 26	
08/18/92	LT 9		258	+- 20	LT 16		LT 27		LT 35	
11/10/92	LT 9		266	+- 17	LT 19		LT 29		LT 59	
Yearly	--		262	+- 73	--		--		--	
02/23/93	LT 5		17	+- 16	LT 13		LT 45		LT 29	
05/06/93	LT 9		201	+- 10	LT 27		LT 30		LT 55	
08/18/93	LT 6		120	+- 10	LT 17		LT 20		LT 61	
11/22/93	LT 8		193	+- 14	LT 25		LT 25		LT 54	
Yearly	--		133	+- 171	--		--		--	
03/21/94	LT 8		211	+- 17	LT 17		LT 26		LT 36	
06/20/94	LT 8		212	+- 14	LT 13		LT 21		LT 28	
08/23/94	LT 8		243	+- 16	LT 10		LT 22		LT 21	
11/28/94	LT 4		97	+- 5	LT 6		LT 13		LT 13	
Yearly	--		191	+- 128	--		--		--	
Overall	--		210	+- 122	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLNG040 - Calvert Cliffs LNG Plant Pipeline Station 4										
02/13/91	LT 16		227	+- 25	LT 23		LT 37		LT 53	
05/01/91	LT 13		145	+- 20	LT 17		LT 40		LT 55	
08/14/91	LT 30		219	+- 44	LT 129		LT 103		LT 295	
11/25/91	LT 13		37	+- 15	LT 17		LT 30		LT 41	
Yearly	--		157	+- 176	--		--		--	
02/19/92	LT 22		234	+- 25	LT 33		LT 49		LT 85	
05/05/92	LT 6		140	+- 6	LT 13		LT 16		LT 10	
08/18/92	LT 19		145	+- 22	LT 26		LT 43		LT 58	
11/10/92	LT 7		103	+- 10	LT 17		LT 21		LT 26	
Yearly	--		156	+- 111	--		--		--	
02/23/93	LT 6		155	+- 11	LT 15		LT 19		LT 27	
05/06/93	LT 9		610	+- 20	LT 37		LT 33		LT 59	
08/18/93	LT 8		143	+- 11	LT 28		LT 26		LT 80	
11/22/93	LT 7		227	+- 8	LT 26		LT 23		LT 56	
Yearly	--		284	+- 441	--		--		--	
03/21/94	LT 8		26	+- 9	LT 17		LT 25		LT 61	
06/20/94	LT 5		LT 7		LT 11		LT 20		LT 22	
08/23/94	LT 6		9	+- 7	LT 10		LT 19		LT 20	
11/28/94	LT 6		103	+- 11	LT 9		LT 18		LT 20	
Yearly	--		46	+- 100	--		--		--	
Overall	--		161	+- 194	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCOV010 - Calvert Cliffs Cove Point Station 1										
02/13/91	LT 9		63	+- 14	LT 10		LT 16		LT 22	
05/01/91	LT 7		34	+- 9	LT 9		LT 15		LT 19	
08/14/91	LT 3		46	+- 4	LT 6		LT 8		LT 5	
11/25/91	LT 3		44	+- 5	LT 5		LT 7		LT 10	
Yearly	--		47	+- 24	--		--		--	
02/19/92	LT 4		48	+- 4	LT 45		LT 9		LT 13	
05/05/92	LT 14		73	+- 17	LT 20		LT 27		LT 49	
08/18/92	LT 14		65	+- 17	LT 11		LT 23		LT 26	
11/10/92	LT 24		80	+- 27	LT 117		LT 62		LT 131	
Yearly	--		67	+- 28	--		--		--	
02/23/93	LT 4		41	+- 4	LT 14		LT 11		LT 36	
05/06/93	LT 4		54	+- 5	LT 13		LT 12		LT 42	
08/18/93	LT 4		58	+- 5	LT 12		LT 11		LT 24	
11/22/93	LT 3		34	+- 3	LT 11		LT 8		LT 22	
Yearly	--		47	+- 22	--		--		--	
03/21/94	LT 3		37	+- 5	LT 7		LT 10		LT 16	
06/20/94	LT 3		47	+- 5	LT 6		LT 9		LT 12	
08/23/94	LT 4		46	+- 5	LT 5		7	+- 14	LT 11	
11/28/94	LT 3		40	+- 4	LT 5		LT 8		LT 10	
Yearly	--		43	+- 10	--		7	+- 14	--	
Overall	--		51	+- 22	--		7	+- 14	--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCOV020 - Calvert Cliffs Cove Point Station 2										
02/13/91	LT 4		95	+- 5	LT 7		LT 11		LT 13	
05/01/91	LT 12		278	+- 15	LT 18		LT 26		LT 32	
08/14/91	LT 4		97	+- 5	LT 9		LT 11		LT 3	
11/25/91	LT 11		98	+- 15	LT 10		LT 21		LT 24	
Yearly	--		142	+- 181	--		--		--	
02/19/92	LT 4		81	+- 7	LT 12		LT 11		LT 37	
05/05/92	LT 19		127	+- 25	LT 33		LT 40		LT 53	
08/18/92	LT 5		98	+- 8	LT 8		LT 13		LT 21	
11/10/92	LT 5		94	+- 6	LT 11		LT 14		LT 25	
Yearly	--		100	+- 39	--		--		--	
02/23/93	LT 4		80	+- 6	LT 15		LT 13		LT 25	
05/06/93	LT 6		111	+- 7	LT 21		LT 20		LT 46	
08/18/93	LT 4		79	+- 5	LT 14		LT 13		LT 25	
11/22/93	LT 5		100	+- 6	LT 18		LT 15		LT 39	
Yearly	--		93	+- 31	--		--		--	
03/21/94	LT 5		95	+- 8	LT 10		LT 14		LT 23	
06/20/94	LT 2		94	+- 7	LT 3		LT 4		LT 10	
08/23/94	LT 4		89	+- 5	LT 5		LT 10		LT 11	
11/28/94	LT 4		95	+- 5	LT 6		LT 10		LT 12	
Yearly	--		93	+- 6	--		--		--	
Overall	--		107	+- 47	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCOV030 - Calvert Cliffs Cove Point Station 3										
02/13/91	LT 10		71	+- 22	LT 15		LT 22		LT 6	
05/01/91	LT 6		242	+- 13	LT 11		LT 18		LT 10	
08/14/91	LT 19		234	+- 31	LT 42		LT 60		LT 102	
11/25/91	LT 8		222	+- 16	LT 23		LT 23		LT 23	
Yearly	--		192	+- 163	--		--		--	
02/19/92	LT 8		221	+- 17	LT 41		LT 24		LT 32	
05/05/92	LT 10		222	+- 19	LT 21		LT 28		LT 44	
08/18/92	LT 9		258	+- 18	LT 17		LT 29		LT 34	
11/10/92	LT 19		267	+- 28	LT 36		LT 48		LT 83	
Yearly	--		242	+- 48	--		--		--	
02/23/93	LT 8		238	+- 17	LT 29		LT 21		LT 22	
05/06/93	LT 11		242	+- 18	LT 39		LT 37		LT 84	
08/18/93	LT 10		318	+- 19	LT 36		LT 34		LT 75	
11/22/93	LT 8		254	+- 14	LT 28		LT 26		LT 25	
Yearly	--		263	+- 75	--		--		--	
03/21/94	LT 5		100	+- 9	LT 12		LT 16		LT 24	
06/20/94	LT 10		384	+- 19	LT 17		LT 29		LT 39	
08/23/94	LT 8		213	+- 16	LT 11		LT 23		LT 24	
11/28/94	LT 9		227	+- 18	LT 15		LT 28		LT 31	
Yearly	--		231	+- 234	--		--		--	
Overall	--		232	+- 59	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCCOV040 - Calvert Cliffs Cove Point Station 4										
02/13/91	LT 8		113	+- 12	LT 13		LT 19		LT 8	
05/01/91	LT 4		33	+- 5	LT 7		LT 13		LT 8	
08/14/91	LT 13		16	+- 14	LT 31		LT 43		LT 71	
11/25/91	LT 5		64	+- 6	LT 22		LT 15		LT 8	
Yearly	--		57	+- 85	--		--		--	
02/19/92	LT 17		49	+- 19	LT 22		LT 41		LT 71	
05/05/92	LT 6		21	+- 8	LT 13		LT 18		LT 10	
08/18/92	LT 18		151	+- 25	LT 25		LT 41		LT 55	
11/10/92	LT 64		LT 60		LT 141		LT 157		LT 350	
Yearly	--		74	+- 137	--		--		--	
02/23/93	LT 7		49	+- 9	LT 27		LT 25		LT 50	
05/06/93	LT 8		51	+- 7	LT 35		LT 30		LT 76	
08/18/93	LT 7		30	+- 9	LT 22		LT 23		LT 45	
11/22/93	LT 6		35	+- 9	LT 25		LT 24		LT 78	
Yearly	--		41	+- 21	--		--		--	
03/21/94	LT 7		33	+- 9	LT 18		LT 25		LT 33	
06/20/94	LT 7		23	+- 9	LT 12		LT 22		LT 21	
08/23/94	LT 7		150	+- 7	LT 10		LT 18		LT 21	
11/28/94	LT 5		30	+- 6	LT 8		LT 15		LT 26	
Yearly	--		59	+- 122	--		+-		+-	
Overall	--		58	+- 27	--		+-		+-	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLCP010 - Calvert Cliffs Little Cove Point Station 1										
02/13/91	LT 9		347 +- 6		11 +- 11		LT 18		LT 9	
05/01/91	LT 10		146 +- 18		LT 19		LT 32		LT 42	
08/14/91	LT 4		176 +- 8		LT 6		LT 12		LT 8	
11/25/91	LT 5		311 +- 13		LT 22		LT 15		LT 17	
Yearly	--		245 +- 198		11 +- 11		--		--	
02/19/92	LT 4		145 +- 8		LT 33		LT 12		LT 19	
05/05/92	LT 15		210 +- 19		LT 24		LT 34		LT 62	
08/18/92	LT 15		250 +- 22		LT 21		LT 36		LT 48	
11/10/92	LT 27		389 +- 46		LT 74		LT 84		LT 161	
Yearly	--		249 +- 206		--		--		--	
02/23/93	LT 5		234 +- 10		LT 19		LT 17		LT 54	
05/06/93	LT 3		105 +- 6		LT 8		LT 10		LT 26	
08/18/93	LT 5		264 +- 10		LT 15		LT 17		LT 31	
11/22/93	LT 6		402 +- 10		LT 33		LT 23		LT 72	
Yearly	--		251 +- 244		--		--		--	
03/21/94	LT 7		289 +- 16		LT 16		LT 22		LT 35	
06/20/94	LT 6		249 +- 13		LT 10		LT 17		LT 22	
08/23/94	LT 4		263 +- 10		LT 6		LT 12		LT 13	
11/28/94	LT 8		418 +- 17		LT 13		LT 23		LT 27	
Yearly	--		305 +- 155		--		--		--	
Overall	--		262 +- 57		11 +- 11		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCLCP020 - Calvert Cliffs Little Cove Point Station 2										
02/13/91	LT 9		355	+- 16	LT 12		LT 24		LT 27	
05/01/91	LT 8		257	+- 8	LT 10		LT 21		LT 7	
08/14/91	LT 8		406	+- 10	LT 15		LT 24		LT 35	
11/25/91	LT 8		311	+- 18	LT 11		LT 22		LT 23	
Yearly	--		332	+- 127	--		--		--	
02/19/92	LT 8		199	+- 16	LT 42		LT 25		LT 39	
05/05/92	LT 8		275	+- 16	LT 19		LT 24		LT 8	
08/18/92	LT 10		206	+- 13	LT 12		LT 24		LT 28	
11/10/92	LT 27		375	+- 47	LT 82		LT 93		LT 163	
Yearly	--		264	+- 163	--		--		--	
02/23/93	LT 7		210	+- 15	LT 21		LT 23		LT 49	
05/06/93	LT 11		305	+- 19	LT 47		LT 39		LT 99	
08/18/93	LT 11		452	+- 22	LT 34		LT 36		LT 96	
11/22/93	LT 8		395	+- 17	LT 31		LT 29		LT 70	
Yearly	--		341	+- 212	--		--		--	
03/21/94	LT 10		276	+- 10	LT 24		LT 31		LT 51	
06/20/94	LT 7		391	+- 17	LT 13		LT 21		LT 28	
08/23/94	LT 8		435	+- 12	LT 11		LT 21		LT 24	
11/28/94	LT 5		262	+- 11	LT 8		LT 13		LT 17	
Yearly	--		341	+- 170	--		--		--	
Overall	--		319	+- 75	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCDRP010 - Calvert Cliffs Drum Point Station 1										
05/01/91	LT 19		167	+- 18	LT 23		LT 41		LT 56	
08/14/91	LT 13		130	+- 22	LT 26		LT 40		LT 58	
11/25/91	LT 4		138	+- 6	LT 25		LT 12		LT 5	
Yearly	--		145	+- 39	--		--		--	
02/19/92	LT 20		190	+- 23	LT 36		LT 44		LT 65	
05/05/92	LT 21		219	+- 25	LT 33		LT 48		LT 84	
08/18/92	LT 7		196	+- 12	LT 13		LT 20		LT 21	
11/10/92	LT 7		190	+- 12	LT 17		LT 21		LT 35	
Yearly	--		199	+- 28	--		--		--	
02/23/93	LT 6		138	+- 7	LT 21		LT 20		LT 44	
05/06/93	LT 6		136	+- 6	LT 26		LT 21		LT 52	
08/18/93	LT 7		195	+- 11	LT 18		LT 21		LT 44	
11/22/93	LT 7		181	+- 12	LT 27		LT 24		LT 60	
Yearly	--		163	+- 60	--		--		--	
03/21/94	LT 8		184	+- 15	LT 19		LT 25		LT 40	
06/20/94	LT 5		215	+- 6	LT 10		LT 15		LT 21	
08/23/94	LT 6		206	+- 12	LT 9		LT 18		LT 20	
11/28/94	LT 6		174	+- 12	LT 10		LT 17		LT 21	
Yearly	--		195	+- 38	--		--		--	
Overall	--		175	+- 52	--		--		--	

Table 1. Radionuclide Concentrations in Sediments (pCi/kg +- 2 sigma error)

	Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCDRP020 - Calvert Cliffs Drum Point Station 2										
02/13/91	LT 12		426	+- 18	LT 19		LT 27		LT 6	
05/01/91	LT 20		274	+- 25	LT 13		LT 46		LT 69	
08/14/91	LT 21		255	+- 44	LT 42		LT 66		LT 90	
11/25/91	LT 26		275	+- 38	LT 33		LT 55		LT 77	
Yearly	--		308	+- 159	--		--		--	
02/19/92	LT 28		300	+- 20	LT 39		LT 61		LT 98	
05/05/92	LT 28		312	+- 39	LT 45		LT 63		LT 113	
08/18/92	LT 24		329	+- 37	LT 23		LT 50		LT 53	
11/10/92	LT 11		296	+- 21	LT 28		LT 33		LT 57	
Yearly	--		309	+- 30	--		--		--	
02/23/93	LT 8		298	+- 16	LT 31		LT 27		LT 56	
05/06/93	LT 12		299	+- 23	31	+- 44	LT 44		LT 115	
08/18/93	LT 11		457	+- 25	LT 31		LT 36		LT 48	
11/22/93	LT 8		307	+- 7	LT 31		LT 27		LT 67	
Yearly	--		340	+- 156	31	+- 44	--		--	
03/21/94	LT 11		445	+- 23	LT 26		LT 33		LT 63	
06/20/94	LT 11		319	+- 21	LT 18		LT 30		LT 38	
08/23/94	LT 8		321	+- 16	LT 12		LT 22		LT 26	
11/28/94	LT 7		274	+- 13	LT 11		LT 18		LT 24	
Yearly	--		340	+- 147	--		--		--	
Overall	--		324	+- 37	31	+- 44	--		--	

Table 2. Radionuclide Concentrations in Oysters (pCi/kg +- 2 sigma error)

DATE	EXPOSURE	Be-7 CONC	Be-7 ERR	K-40 CONC	K-40 ERR	Ag-110m CONC	Ag-110m ERR	Co-58 CONC	Co-58 ERR	Co-60 CONC	Co-60 ERR
Station CCKEB000 - Calvert Cliffs Kenwood Beach Station											
03/26/91	CONTROL	LT	79	1019	82	LT	13	LT	10	LT	11
06/11/91	CONTROL	LT	145	1388	105	LT	19	LT	16	LT	16
09/25/91	CONTROL	LT	100	1788	132	LT	16	LT	12	LT	13
12/10/91	CONTROL	LT	66	1997	116	LT	9	LT	7	LT	7
Yearly		--		1548	868	--		--		--	
03/26/92	CONTROL	LT	53	1809	116	LT	7	LT	6	LT	7
06/04/92	CONTROL	LT	55	2000	124	LT	8	LT	6	LT	7
09/21/92	CONTROL	LT	105	1299	135	LT	15	LT	12	LT	12
12/02/92	CONTROL	LT	230	1300	175	LT	10	LT	25	LT	20
Yearly		--		1602	716	--		--		--	
03/25/93	CONTROL	LT	63	1161	151	LT	17	LT	11	LT	17
06/16/93	CONTROL	LT	122	948	102	LT	13	LT	12	LT	9
09/23/93	CONTROL	LT	78	1484	80	LT	5	LT	7	LT	4
Yearly		--		1198	540	--		--		--	
03/28/94	CONTROL	LT	31	951	68	LT	4	LT	4	LT	4
06/14/94	CONTROL	LT	58	1275	89	LT	7	LT	6	LT	5
09/12/94	CONTROL	LT	50	1182	102	LT	8	LT	6	LT	8
12/01/94	CONTROL	80	68	1338	107	LT	9	LT	8	LT	7
Yearly		80	68	1187	339	--		--		--	
Overall		80	68	1384	444	--		--		--	
Station CCPDB000 - Calvert Cliffs Plant Discharge Bar Station											
05/01/91	NONE	33	20	762	37	89	5	LT	2	LT	2
08/14/91	NONE	51	20	1561	56	LT	70	LT	2	LT	3
11/25/91	NONE	16	18	1484	53	49	5	12	3	LT	2
Yearly		33	35	1269	882	69	57	12	3	--	
02/19/92	NONE	LT	18	1412	56	4	4	2	2	LT	2
05/05/92	NONE	37	20	996	48	29	5	LT	2	LT	2

Table 2. Radionuclide Concentrations in Oysters (pCi/kg +- 2 sigma error)

		Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	EXPOSURE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
08/18/92	NONE	32	22	1133	52	25	5	12	3	3	3
11/10/92	NONE	LT	141	1287	162	LT	25	LT	17	LT	20
Yearly		35	7	1207	362	19	27	7	14	3	3
Overall		34	2	1238	88	44	70	10	7	3	3
		Station CCPLS000 - Calvert Cliffs Plant Site Station									
03/26/91	90	LT	59	1313	118	19	8	LT	6	LT	7
03/26/91	273	LT	45	799	56	111	8	LT	4	LT	4
06/12/91	78	LT	92	1856	122	43	14	LT	9	LT	9
06/12/91	187	27	29	1124	63	28	6	LT	3	LT	4
06/12/91	365	85	64	1146	73	109	11	LT	4	LT	4
09/25/91	105	45	48	1676	101	60	9	LT	5	LT	5
12/10/91	76	LT	29	1356	73	13	6	2	4	LT	3
12/10/91	182	LT	86	1917	123	36	11	LT	9	LT	8
12/10/91	259	LT	29	1483	74	37	6	5	4	LT	3
Yearly		52	59	1408	731	51	73	4	4	--	
03/26/92	107	LT	22	1423	74	2	2	LT	3	LT	3
06/04/92	70	LT	63	1935	124	LT	8	LT	7	LT	7
06/04/92	177	24	22	1508	81	2	2	LT	3	LT	3
06/04/92	358	26	25	1358	79	11	7	LT	3	LT	4
09/21/92	109	LT	183	544	92	32	27	LT	21	LT	22
09/21/92	286	LT	108	870	115	LT	19	LT	13	LT	14
12/02/92	90	LT	55	977	86	LT	8	LT	7	LT	6
12/02/92	180	LT	122	618	88	LT	22	LT	14	LT	17
Yearly		25	3	1154	962	12	28	--		--	
03/25/93	113	LT	37	920	79	LT	7	LT	4	LT	5
06/17/93	84	LT	95	1116	98	40	13	LT	10	LT	7
06/17/93	197	LT	154	1607	154	70	19	LT	16	LT	11
06/17/93	267	LT	157	886	113	37	25	LT	17	LT	10

Table 2. Radionuclide Concentrations in Oysters (pCi/kg +- 2 sigma error)

		Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	EXPOSURE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
09/23/93	98	LT	164	1106	+- 97	18	+- 12	LT	14	LT	7
12/02/93	90	LT	43	1439	+- 81	99	+- 20	LT	4	LT	4
12/02/93	188	LT	60	1376	+- 96	78	+- 17	LT	6	LT	5
Yearly		--		1207	+- 545	57	+- 61	--		--	
03/31/94	118	LT	30	864	+- 16	24	+- 6	LT	3	LT	3
03/31/94	284	LT	39	1253	+- 63	52	+- 8	LT	4	LT	4
06/16/94	79	LT	42	1309	+- 58	9	+- 5	LT	4	LT	3
06/16/94	195	33	+- 42	1074	+- 64	25	+- 6	LT	4	LT	4
06/16/94	363	LT	67	1668	+- 87	35	+- 10	LT	7	LT	5
09/13/94	89	37	+- 29	1705	+- 75	5	+- 5	LT	3	LT	4
12/05/94	83	LT	37	2080	+- 79	LT	5	LT	4	LT	4
12/05/94	172	LT	36	1452	+- 78	4	+- 5	LT	4	LT	4
12/05/94	251	LT	42	2160	+- 91	6	+- 5	LT	4	LT	4
Yearly		35	+- 6	1507	+- 874	20	+- 35	--		--	
Overall		37	+- 28	1319	+- 333	35	+- 44	--		--	
Station CCCOV000 - Calvert Cliffs Cove Point Station											
06/13/94	80	LT	82	1745	+- 94	29	+- 9	LT	8	LT	6
Yearly		--		1745	+- 94	29	+- 9	--		--	
Overall		--		1745	+- 94	29	+- 9	--		--	

Table 2. Radionuclide Concentrations in Oysters (pCi/kg +- 2 sigma error)

		Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	EXPOSURE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCKEB000 - Calvert Cliffs Kenwood Beach Station											
03/26/91	CONTROL	LT 8		LT 9		LT 10		LT 20		LT 22	
06/11/91	CONTROL	LT 11		LT 13		LT 16		LT 32		LT 38	
09/25/91	CONTROL	LT 10		LT 11		LT 13		LT 26		LT 28	
12/10/91	CONTROL	LT 5		LT 6		LT 7		LT 13		LT 16	
Yearly		--		--		--		--		--	
03/26/92	CONTROL	LT 6		LT 6		LT 6		LT 12		LT 13	
06/04/92	CONTROL	LT 6		LT 6		LT 6		LT 14		LT 13	
09/21/92	CONTROL	LT 10		LT 12		LT 11		LT 23		LT 25	
12/02/92	CONTROL	LT 19		LT 20		LT 24		LT 42		LT 42	
Yearly		--		--		--		--		--	
03/25/93	CONTROL	LT 4		LT 7		LT 9		LT 35		LT 19	
06/16/93	CONTROL	LT 7		LT 9		LT 13		LT 20		LT 29	
09/23/93	CONTROL	LT 3		LT 3		LT 8		LT 8		LT 16	
Yearly		--		--		--		--		--	
03/28/94	CONTROL	LT 2		LT 3		LT 4		LT 7		LT 9	
06/14/94	CONTROL	LT 4		LT 4		LT 6		LT 10		LT 13	
09/12/94	CONTROL	LT 5		LT 6		LT 6		LT 12		LT 13	
12/01/94	CONTROL	LT 5		LT 6		LT 8		LT 13		LT 18	
Yearly		--		--		--		--		--	
Overall		--		--		--		--		--	
Station CCPDB000 - Calvert Cliffs Plant Discharge Bar Station											
05/01/91	NONE	LT 2		LT 2		LT 3		LT 5		LT 5	
08/14/91	NONE	LT 2		2	+- 2	LT 20		LT 5		LT 5	
11/25/91	NONE	LT 2		LT 2		LT 2		LT 5		LT 5	
Yearly		--		2	+- 2	--		--		--	
02/19/92	NONE	LT 2		LT 2		LT 2		LT 5		LT 4	
05/05/92	NONE	LT 2		LT 2		LT 2		LT 4		LT 4	

Table 2. Radionuclide Concentrations in Oysters (pCi/kg +- 2 sigma error)

		Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	EXPOSURE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
08/18/92	NONE	LT 2		LT 2		LT 7		LT 4		LT 4	
11/10/92	NONE	LT 16		LT 18		LT 18		LT 38		LT 36	
Yearly		--		--		--		--		--	
Overall		--		2 +- 2		--		--		--	
		Station CCPLS000 - Calvert Cliffs Plant Site Station									
03/26/91	90	LT 5		LT 7		LT 7		LT 14		LT 14	
03/26/91	273	LT 4		LT 10		LT 25		LT 7		LT 9	
06/12/91	78	LT 7		LT 8		LT 10		LT 18		LT 24	
06/12/91	187	LT 2		LT 3		LT 4		LT 7		LT 8	
06/12/91	365	LT 3		LT 3		LT 35		LT 8		LT 9	
09/25/91	105	LT 4		LT 5		LT 13		LT 10		LT 10	
12/10/91	76	LT 2		LT 3		LT 3		LT 6		LT 7	
12/10/91	182	LT 7		LT 9		LT 8		LT 16		LT 20	
12/10/91	259	LT 2		LT 3		LT 3		LT 6		LT 7	
Yearly		--		--		--		--		--	
03/26/92	107	LT 2		LT 3		LT 3		LT 6		LT 5	
06/04/92	70	LT 6		LT 7		LT 6		LT 15		LT 16	
06/04/92	177	LT 2		LT 3		LT 3		LT 7		LT 6	
06/04/92	358	LT 3		LT 3		LT 6		LT 7		LT 6	
09/21/92	109	LT 18		LT 22		LT 22		LT 47		LT 51	
09/21/92	286	LT 11		LT 13		LT 14		LT 31		LT 30	
12/02/92	90	LT 4		LT 5		LT 7		LT 13		LT 14	
12/02/92	180	LT 12		LT 14		LT 15		LT 30		LT 33	
Yearly		--		--		--		--		--	
03/25/93	113	LT 4		LT 4		LT 4		LT 10		LT 10	
06/17/93	84	LT 6		LT 7		LT 16		LT 16		LT 22	
06/17/93	197	LT 9		LT 11		LT 28		LT 24		LT 33	
06/17/93	267	LT 10		LT 10		LT 19		LT 24		LT 37	

Table 2. Radionuclide Concentrations in Oysters (pCi/kg +- 2 sigma error)

		Cs-134		Cs-137		Nb-95		Zn-65		Zr-95	
DATE	EXPOSURE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
09/23/93	98	LT 6		LT 7		LT 15		LT 17		LT 35	
12/02/93	90	LT 3		LT 4		LT 5		LT 8		LT 8	
12/02/93	188	LT 4		LT 5		LT 7		LT 12		LT 12	
Yearly		--		--		--		--		--	
03/31/94	118	LT 2		LT 3		LT 9		LT 6		LT 7	
03/31/94	284	LT 3		LT 4		LT 5		LT 7		LT 10	
06/16/94	79	LT 2		LT 3		LT 4		LT 6		LT 9	
06/16/94	195	LT 3		LT 3		LT 5		LT 7		LT 10	
06/16/94	363	LT 4		LT 4		LT 7		LT 11		LT 15	
09/13/94	89	LT 3		LT 3		LT 3		LT 8		LT 7	
12/05/94	83	LT 3		LT 3		LT 4		LT 7		LT 9	
12/05/94	172	LT 3		LT 3		LT 4		LT 8		LT 9	
12/05/94	251	LT 3		LT 4		LT 5		LT 8		LT 10	
Yearly		--		--		--		--		--	
Overall		--		--		--		--		--	
Station CCCOV000 - Calvert Cliffs Cove Point Station											
06/13/94	80	LT 5		LT 6		LT 9		LT 13		LT 20	
Yearly		--		--		--		--		--	
Overall		--		--		--		--		--	

Table 3. Radionuclide Concentrations in Epifauna (pCi/kg +- 2 sigma error)

	Be-7		K-40		Ag-110m		Co-58		Co-60	
DATE	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR	CONC	ERR
Station CCKEB000 - Calvert Cliffs Kenwood Beach Station										
06/11/91	822	+- 553	2935	+- 235	LT 60		LT 51		LT 51	
Yearly	822	+- 553	2935	+- 235	--		--		--	
Overall	822	+- 553	2935	+- 235	--		--		--	
Station CCCCP000 - Calvert Cliffs Plant site Discharge Station										
06/11/91	2061	+- 237	4891	+- 313	LT 22		25	+- 19	55	+- 25
Yearly	2061	+- 237	4891	+- 313	--		25	+- 19	55	+- 25
Overall	2061	+- 237	4891	+- 313	--		25	+- 19	55	+- 25
Station CCROP010 - Calvert Cliffs Rocky Point Station 1										
06/11/91	909	+- 331	3213	+- 315	LT 30		LT 24		LT 25	
Yearly	909	+- 331	3213	+- 315	--		--		--	
Overall	909	+- 331	3213	+- 315	--		--		--	

Table 3. Radionuclide Concentrations in Epifauna (pCi/kg +- 2 sigma error)

DATE	Cs-134 CONC	Cs-134 ERR	Cs-137 CONC	Cs-137 ERR	Nb-95 CONC	Nb-95 ERR	Zn-65 CONC	Zn-65 ERR	Zr-95 CONC	Zr-95 ERR
Station CCKEB000 - Calvert Cliffs Kenwood Beach Station										
06/11/91	LT 41		LT 49		LT 52		LT 104		LT 112	
Yearly	--		--		--		--		--	
Overall	--		--		--		--		--	
Station CCCCP000 - Calvert Cliffs Plant site Discharge Station										
06/11/91	LT 13		51 +- 22		LT 20		LT 30		LT 10	
Yearly	--		51 +- 22		--		--		--	
Overall	--		51 +- 22		--		--		--	
Station CCROP010 - Calvert Cliffs Rocky Point Station 1										
06/11/91	LT 24		LT 28		LT 28		LT 49		LT 64	
Yearly	--		--		--		--		--	
Overall	--		--		--		--		--	